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APÊNDICE A

Com o objetivo de validar os resultados numéricos calculados com o programa ABAQUS (v. 6.3) a mesma análise numérica da barragem de Pomacocha foi realizada com o programa computacional Plaxis v.7.2, também disponível no Departamento de Engenharia Civil da PUC-Rio.

Na impossibilidade de comparar-se os valores de tensões e deslocamentos exatamente nos mesmos pontos nodais, devido a diferenças na geração automática das malhas de elementos finitos por ambos os programas (1895 pontos nodais e 333 elementos finitos quadráticos no ABAQUS e 1205 nós e 552 elementos quadráticos no Plaxis) as comparações entre ambos os resultados são feitas de modo aproximado nas seguintes tabelas A1 e A2.

Conforme pode-se observar, os valores de tensão são bastante próximos entre si (tabela A1), indicando quantitativamente que o problema foi bem modelado por ambos os programas computacionais. No entanto, os valores de deslocamentos, principalmente em relação à componente vertical, são bastante discrepantes em razão da incapacidade do software Plaxis (v.7.2) em adequadamente simular a construção incremental de aterros.

Programa	Nó	X (m)	Y (m)	σ_{11} (kPa)	σ_{22} (kPa)	σ_{12} (kPa)
Plaxis	265	154.08	30.66	-148.367	-546.120	-7.384
ABAQUS	484	158.58	29.6	-154.880	-546.840	-3.750
Plaxis	184	109.06	30.66	-121.747	-232.732	-36.161
ABAQUS	540	110.10	29.80	-125.810	-242.380	-35.392
Plaxis	497	207.18	30.66	-138.950	-244.311	-24.297
ABAQUS	339	207.24	31.66	-139.930	-234.640	-22.356

Tabela A1 – Comparação dos valores de tensão obtidos com os programas Plaxis e ABAQUS ao final do estágio de construção.

Programa	Ponto nodal	X (m)	Y (m)	Deslocamento horizontal (cm)	Deslocamento vertical (cm)
Plaxis	1004	226.92	32	1.15	-22.55
ABAQUS	246	226.15	31.85	2.26	-14.24
Plaxis	1004	226.92	32	7.77	-21.25
ABAQUS	246	226.15	31.85	7.07	-19.37
Plaxis	749	178.21	21.94	3.07	-8.74
ABAQUS	47	178.20	21.94	-1.85	-6.11
Plaxis	749	178.21	21.94	4.49	-25.41
ABAQUS	47	178.20	21.9	4.27	-21.89
Plaxis	596	155.41	38.43	-2.66	-58.66
ABAQUS	365	154.68	38.07	-1.37	-36.72

Tabela A2 – Comparação dos valores de deslocamento obtidos com os programas Plaxis e ABAQUS ao final do estágio de construção.

APÊNDICE B

Lista-se neste apêndice o arquivo de entrada de dados utilizados no programa ABAQUS (V 6.3) para simulação computacional da construção incremental, primeiro enchimento do reservatório e análise sísmica do comportamento da barragem de Pomacocha (Peru).


```
*Heading
** Job name: Junio02 Model name: Model-1
*Preprint, echo=YES, model=YES, history=YES, contact=YES
**
** PARTS
**
*Part, name=Corpo-No
*End Part
*Part, name="Esp A"
*End Part
*Part, name="Esp B"
*End Part
*Part, name="Fundaçao A"
*End Part
*Part, name="Fundaçao B"
*End Part
*Part, name=Nucleo-An
*End Part
*Part, name=filtro
*End Part
**
** ASSEMBLY
**
*Assembly, name=Assembly
**
*Instance, name="Fundaçao A-1", part="Fundaçao A"
*Node
      1,         130.,          10.
      2,         127.,          20.
      3,          60.,          20.
     ..........................................
    ..........................................
   412,     202.3507,     16.29863
   413,     201.9315,          10.
   414,     204.3239,     12.35216
*Element, type=CPE8
  1,   1,  11,  83,  48, 153, 154, 155, 156
  2,  11,  12,  84,  83, 157, 158, 159, 154
  3,  12,   2,  13,  84, 160, 161, 162, 158
```

.....
.....
109, 9, 151, 72, 10, 402, 408, 409, 410
110, 151, 152, 71, 72, 405, 411, 412, 408
111, 152, 70, 7, 71, 407, 413, 414, 411
*Element, type=CINPE5R
70, 49, 127, 36, 6, 311
71, 127, 128, 35, 36, 314
72, 128, 34, 4, 35, 316
** As linhas anteriores se referem a um conjunto de elementos infinitos, cuja descrição deve ser complementada através do comando Orientation
*Nset, nset="Fundacao A-Nucleo An"
7, 9, 10, 71, 72, 409, 410, 412, 414
*Elset, elset="Fundacao A-Nucleo An", generate
109, 111, 1
*Nset, nset="Fundacao A-Esp A"
8, 9, 77, 78, 79, 80, 81, 82, 361, 368, 375, 382, 389, 396, 403
*Elset, elset="Fundacao A-Esp A", generate
88, 106, 3
*Nset, nset="Fundacao A-Filtro"
2, 3, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 161, 168
175, 182, 189, 196, 203, 210, 217, 224, 231, 238, 245
*Elset, elset="Fundacao A-Filtro", generate
3, 39, 3
*Nset, nset="Fundacao A-Corpo No"
2, 8, 73, 74, 75, 76, 326, 333, 340, 347, 354
*Elset, elset="Fundacao A-Corpo No", generate
73, 85, 3
** Region: (Fundacao A:Picked)
*Elset, elset=_I1, internal, generate
1, 111, 1
** Section: Fundacao A
*Orientation, name=infinito
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** Linhas de comando complementarias ao comando ELEMENT para elementos infinitos
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1.,
*End Instance
**
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*Node
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2, 127., 24.
3, 127., 20.
.....
.....
676, 174.65, 53.
677, 172.5, 55.
678, 136.6, 53.
*Element, type=CPE6
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2, 47, 44, 46, 192, 193, 194
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301, 174, 173, 181, 618, 668, 669

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302, 175, 174, 180, 621, 670, 671
303, 188,  39, 184, 678, 639, 664
*Nset, nset="Corpo No-Filtro"
  2,  3,  6,  7,  9, 10, 11, 13, 17, 19, 23, 27, 28, 69, 70, 71
 72, 73, 74, 75, 76, 77, 78, 196, 236, 246, 249, 252, 256, 262, 268, 273
277, 279, 283, 284, 286, 307, 320, 391, 426, 455, 499, 513, 524
*Elset, elset="Corpo No-Filtro"
  3, 23, 31, 32, 33, 35, 38, 40, 42, 45, 46, 49, 50, 51, 62, 72
106, 129, 156, 182, 190, 199
*Nset, nset="Corpo No-Fundacao A"
  3,  4, 46, 47, 48, 49, 194, 199, 203, 212, 213
*Elset, elset="Corpo No-Fundacao A"
 2, 4, 6, 11, 12
*Nset, nset="Corpo No-Esp A"
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388, 409, 411, 422, 452
*Elset, elset="Corpo No-Esp A"
  1, 13, 21, 22, 102, 105, 116, 117, 127, 142
*Nset, nset="Corpo No-Nucleo An"
 14, 15, 22, 101, 325, 364, 448
*Elset, elset="Corpo No-Nucleo An"
 74, 88, 140
** Region: (Corpo No:Picked)
*Elset, elset=_I1, internal, generate
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** Section: Corpo No
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1.,
*End Instance
**
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      2,       165.5,          24.
      3,       155.5,          20.
     .....................................
     .....................................
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     91,     199.9571,          33.
     92,     199.2857,          33.
*Element, type=CPE6
 1,  1, 12,  4, 30, 31, 32
 2, 19, 16,  2, 33, 34, 35
 3, 18,  2, 17, 36, 37, 38
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.....................................
33, 25, 24, 28, 74, 83, 89
34, 24,  5,  9, 71, 77, 81
35,  8,  7, 11, 80, 91, 92
*Nset, nset="Esp A-Corpo No"
 2,  3,  6,  8,  9, 10, 11, 17, 27, 28, 29, 37, 49, 64, 75, 76
82, 85, 88, 90, 92
*Elset, elset="Esp A-Corpo No"
 3,  8, 17, 25, 26, 28, 29, 31, 32, 35
*Nset, nset="Esp A-Fundacao A"
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  3,  4, 18, 19, 20, 21, 22, 23, 39, 48, 50, 51, 52, 54, 58
*Elset, elset="Esp A-Fundacao A"
  4,  7,  8,  9, 10, 11, 14
*Nset, nset="Esp A-Nucleo An"
  1,  4,  5,  7, 11, 32, 70, 79, 91
*Elset, elset="Esp A-Nucleo An"
  1, 21, 27, 35
** Region: (Esp A:Picked)
*Elset, elset=_I1, internal, generate
  1,  35,   1
** Section: Esp A
*Solid Section, elset=_I1, material="Esp A"
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*End Instance
**
*Instance, name="Esp B-1", part="Esp B"
*Node
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      2,         223.,          24.
      3,         225.,          20.
    .....................................
    .....................................
    141,       239.75,          33.
    142,       233.75,          35.
    143,         218.,          34.
*Element, type=CPE6
 1, 21, 16, 20, 44, 45, 46
 2, 24, 12, 13, 47, 48, 49
 3, 18,  2,  3, 50, 51, 52
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.................................................
56,  43,   8,  40, 142, 138, 139
57,  35,   7,  11, 107, 143, 136
58,  36,  35,  41, 110, 137, 135
*Nset, nset="Esp B-Nucleo An"
   2,   3,   6,   7,   9,  11,  51, 101, 116, 122, 143
*Elset, elset="Esp B-Nucleo An"
  3, 30, 39, 42, 57
*Nset, nset="Esp B-Fundacao B"
  3,  4, 19, 20, 21, 22, 23, 24, 25, 26, 27, 46, 54, 58, 64, 66
 70, 72, 75, 78, 80
*Elset, elset="Esp B-Fundacao B"
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** Region: (Esp B:Picked)
*Elset, elset=_I1, internal, generate
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** Section: Esp B
*Solid Section, elset=_I1, material="Esp B"
1.,
*End Instance
**
*Instance, name="Fundaçao B-1", part="Fundaçao B"
*Node
      1,       215.25,          10.
      2,     221.9731,          10.
```

```
     3,     227.5607,          10.
    .....................................
    .....................................
   179,     330.4833,          20.
   180,       338.75,         17.5
   181,     335.9957,          20.
*Element, type=CPE8
 1,   1,   2,  25,  24,  70,  71,  72,  73
 2,   2,   3,  26,  25,  74,  75,  76,  71
 3,   3,   4,  27,  26,  77,  78,  79,  75
 ..........................................................
..........................................................
41,  42,  43,  66,  65, 127, 174, 175, 172
42,  43,  44,  67,  66, 130, 176, 177, 174
43,  44,  45,  68,  67, 133, 178, 179, 176
*Element, type=CINPE5R
22, 45, 22, 23, 46, 132
44, 68, 45, 46, 69, 178
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 151, 153, 155, 157, 159
*Elset, elset="Fundaçao B-Esp A", generate
 24,  33,   1
*Nset, nset="Fundacao B-Nucleo An"
   1,  24,  47,  48,  73, 138, 139
*Elset, elset="Fundacao B-Nucleo An"
  1, 23
** Region: (Fundacao B:Picked)
*Elset, elset=_I1, internal, generate
  1,  44,   1
** Section: Fundacao B
*Orientation, name=infinito
220.6509,10,0,333.7257,17.5,0
*Solid Section, elset=_I1, material="Fundacao B", orientation=infinito
1.,
*End Instance
**
*Instance, name=Nucleo-An-1, part=Nucleo-An
*Node
     1,       200.5,          20.
     2,     196.8714,          24.
     3,       195.5,          20.
    .....................................
    .....................................
   107,     212.3318,          34.
   108,     215.5768,          34.
   109,        218.,          34.
*Element, type=CPE8
 1,  1, 20,  2,  3, 37, 38, 39, 40
 2, 22, 33, 21,  4, 41, 42, 43, 44
 3, 33, 34,  1, 21, 45, 46, 47, 42
 ..........................................
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 9, 35, 36, 24,  5, 54, 60, 61, 57
10, 36, 23,  6, 24, 56, 62, 63, 60
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11, 17,  5,  7,  8, 58, 64, 65, 66
*Element, type=CPE6
12, 27, 20, 19, 67, 49, 68
13, 20, 10,  2, 69, 70, 38
14, 25, 19, 18, 71, 52, 72
.....
.....
35,  28,  31,  30, 106,  99, 107
36,  28,  30,  12, 107, 108,  84
37,  30,  14,  12,  91, 109, 108
38,  28,  11,  31,  87, 105, 106
*Nset, nset="Nucleo An-Fundacao A"
  1,  3,  4, 21, 40, 43, 47
*Elset, elset="Nucleo An-Fundacao A", generate
 1,  3,  1
*Nset, nset="Nucleo An-Esp A"
   2,   3,  10,  15,  16,  39,  70,  94, 102
*Elset, elset="Nucleo An-Esp A"
  1, 13, 26, 32
*Nset, nset="Nucleo An-Corpo No"
  11,  13,  16,  29,  83,  86, 103
*Elset, elset="Nucleo An-Corpo No"
 21, 23, 33
*Nset, nset="Nucleo An-Esp B"
   7,   8,   9,  12,  13,  14,  65,  76,  85, 100, 109
*Elset, elset="Nucleo An-Esp B"
 11, 17, 22, 31, 37
*Nset, nset="Nucleo An-Fundacao B"
  5,  6,  7, 24, 61, 63, 64
*Elset, elset="Nucleo An-Fundacao B", generate
  9,  11,   1
** Region: (Nucleo-An:Picked)
*Elset, elset=_I1, internal, generate
  1,  38,   1
** Section: Nucleo-An
*Solid Section, elset=_I1, material=Nucleo-An
1.,
*End Instance
**
*Instance, name=filtro-1, part=filtro
*Node
      1,        127.,         24.
      2,        125.,         24.
      3,        125.,        21.5
     .....
     .....
    100,         126.,         34.
    101,         125.,         34.
    102,         127.,         34.
*Element, type=CPE6
 1,  2,  3,  1, 36, 37, 38
 2,  1,  3,  6, 37, 39, 40
 3, 35,  3, 15, 41, 42, 43
 .....
31,  7, 14,  8, 97, 99, 90
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32,  14,  13,   9,  96, 100, 101
33,   9,  13,  10, 100, 102,  91
*Nset, nset="Filtro-Fundacao A"
  5,  6, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 46, 52, 58
 62, 66, 70, 73, 75, 79, 81, 85, 86
*Elset, elset="Filtro-Fundacao A"
  4,  6,  8, 10, 12, 14, 16, 17, 20, 21, 24, 25
*Nset, nset="Filtro-Corpo No"
   1,   2,   3,   4,   6,   7,   8,   9,  10,  11,  12,  13,  14,  15,  16,  17
  18,  19,  20,  21,  22,  23,  24,  36,  40,  42,  48,  54,  59,  63,  67,  72
  76,  78,  82,  84,  88,  89,  93,  94,  95,  98,  99, 101, 102
*Elset, elset="Filtro-Corpo No"
  1,  2,  3,  5,  7,  9, 11, 13, 15, 18, 19, 22, 23, 26, 27, 28
 29, 30, 31, 32, 33
** Region: (Filtro:Picked)
*Elset, elset=_I1, internal, generate
  1,  33,   1
** Section: Filtro
*Solid Section, elset=_I1, material=Filtro
1.,
*End Instance
*Nset, nset=_PickedSet233, internal, instance="Fundaçao A-1", generate
   1,  414,    1
*Nset, nset=_PickedSet233, internal, instance="Esp A-1"
  1,  2,  3,  4, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45
 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58
*Elset, elset=_PickedSet233, internal, instance="Fundaçao A-1", generate
   1,  111,    1
*Elset, elset=_PickedSet233, internal, instance="Esp A-1", generate
  1,  14,   1
*Nset, nset=_PickedSet234, internal, instance=Nucleo-An-1
  1,  2,  3,  4,  5,  6,  7,  8, 17, 18, 19, 20, 21, 22, 23, 24
 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48
 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64
 65, 66
*Elset, elset=_PickedSet234, internal, instance=Nucleo-An-1, generate
  1,  11,   1
*Nset, nset=_PickedSet235, internal, instance="Esp B-1"
  1,  2,  3,  4, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
 24, 25, 26, 27, 28, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54
 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70
 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82
*Nset, nset=_PickedSet235, internal, instance="Fundaçao B-1", generate
   1,  181,    1
*Elset, elset=_PickedSet235, internal, instance="Esp B-1", generate
  1,  19,   1
*Elset, elset=_PickedSet235, internal, instance="Fundaçao B-1", generate
  1,  44,   1
*Nset, nset=_PickedSet236, internal, instance="Esp A-1"
  1,  2,  5,  6, 12, 13, 14, 15, 16, 24, 25, 26, 27, 30, 34, 41
 44, 55, 57, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71
 72, 73, 74, 75
*Nset, nset=_PickedSet236, internal, instance="Esp B-1"
   1,   2,   5,   6,  12,  13,  14,  15,  16,  17,  18,  29,  30,  31,  32,  33
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 34,  48,  50,  56,  59,  61,  67,  69,  74,  83,  84,  85,  86,  87,  88,  89
 90,  91,  92,  93,  94,  95,  96,  97,  98,  99, 100, 101, 102, 103, 104, 105
*Nset, nset=_PickedSet236, internal, instance=Nucleo-An-1
 2,  8,  9, 10, 17, 18, 19, 20, 25, 26, 27, 38, 49, 52, 59, 66
67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80
*Elset, elset=_PickedSet236, internal, instance="Esp A-1", generate
15,  25,   1
*Elset, elset=_PickedSet236, internal, instance="Esp B-1", generate
20,  34,   1
*Elset, elset=_PickedSet236, internal, instance=Nucleo-An-1, generate
12,  20,   1
*Nset, nset=_PickedSet237, internal, instance="Esp A-1"
 5,  6,  7,  8,  9, 10, 24, 25, 26, 28, 29, 71, 72, 73, 74, 76
77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
*Nset, nset=_PickedSet237, internal, instance="Esp B-1"
  5,   6,  10,  11,  30,  31,  32,  33,  34,  39,  40,  41,  42,  94, 100, 102
103, 104, 105, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129
130, 131, 132, 133
*Nset, nset=_PickedSet237, internal, instance=Nucleo-An-1
 9, 10, 14, 15, 25, 26, 27, 30, 31, 32, 75, 77, 78, 80, 88, 89
90, 91, 92, 93, 94, 95, 96, 97, 98, 99,100
*Elset, elset=_PickedSet237, internal, instance="Esp A-1", generate
26,  34,   1
*Elset, elset=_PickedSet237, internal, instance="Esp B-1", generate
40,  50,   1
*Elset, elset=_PickedSet237, internal, instance=Nucleo-An-1, generate
24,  31,   1
*Nset, nset=_PickedSet238, internal, instance="Esp A-1"
 7,  8, 11, 80, 91, 92
*Nset, nset=_PickedSet238, internal, instance="Esp B-1"
  7,   8,  10,  11,  35,  36,  39,  40,  41,  43, 107, 110, 112, 120, 121, 125
128, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143
*Nset, nset=_PickedSet238, internal, instance=Nucleo-An-1
 11,  12,  14,  15,  16,  28,  30,  31,  32,  84,  87,  91,  95,  97,  99, 101
102, 103, 104, 105, 106, 107, 108, 109
*Elset, elset=_PickedSet238, internal, instance="Esp A-1"
35,
*Elset, elset=_PickedSet238, internal, instance="Esp B-1", generate
51,  58,   1
*Elset, elset=_PickedSet238, internal, instance=Nucleo-An-1, generate
32,  38,   1
*Nset, nset=_PickedSet239, internal, instance="Esp B-1"
  7,   8,   9,  35,  36,  37,  38, 106, 107, 108, 109, 110, 111, 112, 113, 114
115, 116
*Nset, nset=_PickedSet239, internal, instance=Nucleo-An-1
11, 12, 13, 28, 29, 81, 82, 83, 84, 85, 86, 87
*Elset, elset=_PickedSet239, internal, instance="Esp B-1", generate
35,  39,   1
*Elset, elset=_PickedSet239, internal, instance=Nucleo-An-1, generate
21,  23,   1
*Nset, nset=_PickedSet240, internal, instance=Corpo-No-1
  1,   2,   3,   4,   7,   8,   9,  10,  40,  41,  42,  43,  44,  45,  46,  47
 48,  49,  50,  60,  61,  62,  63,  64,  65,  66,  67,  68,  69,  70,  71,  72
 73,  74,  75,  76,  77,  78, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198
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275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286
*Nset, nset=_PickedSet240, internal, instance=filtro-1
  1,  2,  3,  4,  5,  6, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
.....
73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86
*Elset, elset=_PickedSet240, internal, instance=Corpo-No-1
  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 31, 32, 33
 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49
 50, 51
*Elset, elset=_PickedSet240, internal, instance=filtro-1, generate
  1,  25,   1
*Nset, nset=_PickedSet241, internal, instance=Corpo-No-1
   1,   2,   5,   6,   7,   8,  11,  12,  40,  41,  42,  43,  44,  45,  51,  52
  53,  54,  55,  56,  57,  58,  59,  60,  61,  62,  63,  64,  65,  66,  67,  68
  .....
 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312
 313, 314, 315, 316, 317
*Nset, nset=_PickedSet241, internal, instance=filtro-1
  1,  2,  7,  8, 38, 87, 88, 89, 90
*Elset, elset=_PickedSet241, internal, instance=Corpo-No-1
 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29
 30, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66
 67, 68, 69, 70, 71
*Elset, elset=_PickedSet241, internal, instance=filtro-1
 26, 27
*Nset, nset=_PickedSet242, internal, instance=Corpo-No-1
   5,   6,  11,  12,  18,  19,  20,  21,  28,  29,  52,  53,  54,  55,  56,  57
  58,  59,  79,  80,  81,  82,  83,  84,  85,  86, 115, 116, 117, 118, 119, 120
 .....
 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492
 493, 494, 495, 496, 497, 498, 499
*Nset, nset=_PickedSet242, internal, instance=filtro-1
  7,  8, 13, 14, 90, 96, 97, 98, 99
*Elset, elset=_PickedSet242, internal, instance=Corpo-No-1
 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117
 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 166, 167, 168, 169, 170, 171
 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182
*Elset, elset=_PickedSet242, internal, instance=filtro-1
 30, 31
*Nset, nset=_PickedSet243, internal, instance=Corpo-No-1
  13,  14,  18,  19,  22,  26,  27,  28,  29,  88,  89,  90,  91,  92,  93,  94
  95,  96,  97,  98,  99, 100, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124
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 447, 448, 449, 450, 451, 452, 458, 465, 467, 469, 473, 475, 483, 487, 492, 494
 496, 498, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513
 514,
*Nset, nset=_PickedSet243, internal, instance=filtro-1
   9,  10,  13,  14,  91,  96, 100, 101, 102
*Elset, elset=_PickedSet243, internal, instance=Corpo-No-1
 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143
 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 183, 184, 185, 186
 187, 188, 189, 190, 191, 192, 193, 194, 195
*Elset, elset=_PickedSet243, internal, instance=filtro-1
 32, 33
*Nset, nset=_PickedSet244, internal, instance=Corpo-No-1
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 13,  14,  15,  16,  17,  23,  24,  25,  26,  27,  88,  89,  90,  91,  92,  93
 94,  95,  96,  97,  98,  99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109
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370, 371, 372, 373, 374, 375, 376, 377, 378, 453, 454, 455, 456, 457, 458, 459
460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473
*Nset, nset=_PickedSet244, internal, instance=filtro-1
 9, 10, 11, 12, 91, 92, 93, 94, 95
*Elset, elset=_PickedSet244, internal, instance=Corpo-No-1
 72,  73,  74,  75,  76,  77,  78,  79,  80,  81,  82,  83,  84,  85,  86,  87
 88,  89,  90,  91,  92,  93,  94,  95,  96,  97,  98,  99, 100, 101, 156, 157
158, 159, 160, 161, 162, 163, 164, 165
*Elset, elset=_PickedSet244, internal, instance=filtro-1
28, 29
*Nset, nset=_PickedSet245, internal, instance=Corpo-No-1
 16,  17,  23,  24,  30,  31, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111
112, 113, 114, 129, 130, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154
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542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557
558, 559, 560, 561, 562, 563, 564, 565, 566
*Elset, elset=_PickedSet245, internal, instance=Corpo-No-1, generate
196,  229,    1
*Nset, nset=_PickedSet246, internal, instance=Corpo-No-1
 30,  31,  32,  33, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155
156, 157, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 518
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585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600
601, 602, 603, 604, 605, 606, 607, 608, 609, 610
*Elset, elset=_PickedSet246, internal, instance=Corpo-No-1, generate
230,  258,    1
*Nset, nset=_PickedSet247, internal, instance=Corpo-No-1
 32,  33,  38,  39, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 178
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640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655
656, 657, 658, 659, 660
*Elset, elset=_PickedSet247, internal, instance=Corpo-No-1, generate
267,  288,    1
*Nset, nset=_PickedSet248, internal, instance=Corpo-No-1
 34,  35,  38,  39, 172, 173, 174, 175, 178, 179, 180, 181, 182, 183, 184, 187
188, 613, 618, 621, 623, 627, 629, 632, 639, 641, 646, 650, 652, 656, 661, 662
663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678
*Elset, elset=_PickedSet248, internal, instance=Corpo-No-1, generate
289,  303,    1
*Nset, nset=_PickedSet249, internal, instance=Corpo-No-1
 34,  35,  36,  37, 172, 173, 174, 175, 176, 177, 611, 612, 613, 614, 615, 616
617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627
*Elset, elset=_PickedSet249, internal, instance=Corpo-No-1, generate
259,  266,    1
*Nset, nset=_PickedSet260, internal, instance="Fundaçao A-1"
  1,   5,   6,   7,  37,  38,  39,  40,  41,  42,  43,  44,  45,  46,  47,  48
 49,  50,  51,  52,  53,  54,  55,  56,  57,  58,  59,  60,  61,  62,  63,  64
 65,  66,  67,  68,  69,  70, 156, 165, 172, 179, 186, 193, 200, 207, 214, 221
228, 235, 242, 249, 256, 263, 270, 277, 284, 291, 298, 305, 312, 319, 329, 336
343, 350, 357, 364, 371, 378, 385, 392, 399, 406, 413
*Nset, nset=_PickedSet260, internal, instance="Fundaçao B-1"
  1,   2,   3,   4,   5,   6,   7,   8,   9,  10,  11,  12,  13,  14,  15,  16
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 17,  18,  19,  20,  21,  22,  23,  70,  74,  77,  80,  83,  86,  89,  92,  95
 98, 101, 104, 107, 110, 113, 116, 119, 122, 125, 128, 131, 134
*Nset, nset=_PickedSet260, internal, instance=Nucleo-An-1
 4,  6, 22, 23, 44, 55, 62
*Elset, elset=_PickedSet260, internal, instance="Fundaçao A-1"
  1,   4,   7,  10,  13,  16,  19,  22,  25,  28,  31,  34,  37,  40,  43,  46
 49,  52,  55,  58,  61,  64,  67,  70,  75,  78,  81,  84,  87,  90,  93,  96
 99, 102, 105, 108, 111
*Elset, elset=_PickedSet260, internal, instance="Fundaçao B-1", generate
 1,  22,   1
*Elset, elset=_PickedSet260, internal, instance=Nucleo-An-1
 2, 7,10
*Nset, nset=_PickedSet261, internal, instance="Fundaçao A-1"
  1,   5,   6,   7,  37,  38,  39,  40,  41,  42,  43,  44,  45,  46,  47,  48
 49,  50,  51,  52,  53,  54,  55,  56,  57,  58,  59,  60,  61,  62,  63,  64
 65,  66,  67,  68,  69,  70, 156, 165, 172, 179, 186, 193, 200, 207, 214, 221
228, 235, 242, 249, 256, 263, 270, 277, 284, 291, 298, 305, 312, 319, 329, 336
343, 350, 357, 364, 371, 378, 385, 392, 399, 406, 413
*Nset, nset=_PickedSet261, internal, instance="Fundaçao B-1"
  1,   2,   3,   4,   5,   6,   7,   8,   9,  10,  11,  12,  13,  14,  15,  16
 17,  18,  19,  20,  21,  22,  23,  70,  74,  77,  80,  83,  86,  89,  92,  95
 98, 101, 104, 107, 110, 113, 116, 119, 122, 125, 128, 131, 134
*Nset, nset=_PickedSet261, internal, instance=Nucleo-An-1
 4,  6, 22, 23, 44, 55, 62
*Elset, elset=_PickedSet261, internal, instance="Fundaçao A-1"
  1,   4,   7,  10,  13,  16,  19,  22,  25,  28,  31,  34,  37,  40,  43,  46
 49,  52,  55,  58,  61,  64,  67,  70,  75,  78,  81,  84,  87,  90,  93,  96
 99, 102, 105, 108, 111
*Elset, elset=_PickedSet261, internal, instance="Fundaçao B-1", generate
 1,  22,   1
*Elset, elset=_PickedSet261, internal, instance=Nucleo-An-1
 2, 7,10
*Elset, elset="_Corpo No-Esp A_S3", internal, instance=Corpo-No-1
  1, 116, 117
*Elset, elset="_Corpo No-Esp A_S1", internal, instance=Corpo-No-1
 13, 127
*Elset, elset="_Corpo No-Esp A_S2", internal, instance=Corpo-No-1
 21,  22, 102, 105, 142
*Surface, type=ELEMENT, name="Corpo No-Esp A"
"_Corpo No-Esp A_S3", S3
"_Corpo No-Esp A_S1", S1
"_Corpo No-Esp A_S2", S2
*Elset, elset="_Corpo No-Filtro_S2", internal, instance=Corpo-No-1
  3,  23,  62, 106, 129, 182, 190, 199
*Elset, elset="_Corpo No-Filtro_S3", internal, instance=Corpo-No-1
 31,  32,  33,  35,  38,  40,  42,  45,  46,  72, 156
*Elset, elset="_Corpo No-Filtro_S1", internal, instance=Corpo-No-1, generate
 49,  51,   1
*Surface, type=ELEMENT, name="Corpo No-Filtro"
"_Corpo No-Filtro_S2", S2
"_Corpo No-Filtro_S3", S3
"_Corpo No-Filtro_S1", S1
*Elset, elset="_Corpo No-Fundacao A_S3", internal, instance=Corpo-No-1,
generate
 2,  6,  2
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*Elset, elset="_Corpo No-Fundacao A_S1", internal, instance=Corpo-No-1
 11, 12
*Surface, type=ELEMENT, name="Corpo No-Fundacao A"
"_Corpo No-Fundacao A_S3", S3
"_Corpo No-Fundacao A_S1", S1
*Elset, elset="_Corpo No-Nucleo An_S2", internal, instance=Corpo-No-1
  74, 140
*Elset, elset="_Corpo No-Nucleo An_S1", internal, instance=Corpo-No-1
 88,
*Surface, type=ELEMENT, name="Corpo No-Nucleo An"
"_Corpo No-Nucleo An_S2", S2
"_Corpo No-Nucleo An_S1", S1
*Elset, elset="_Esp A-Corpo No_S2", internal, instance="Esp A-1"
  3,  8, 28, 29, 31
*Elset, elset="_Esp A-Corpo No_S3", internal, instance="Esp A-1"
 17, 32, 35
*Elset, elset="_Esp A-Corpo No_S1", internal, instance="Esp A-1"
 25, 26
*Surface, type=ELEMENT, name="Esp A-Corpo No"
"_Esp A-Corpo No_S2", S2
"_Esp A-Corpo No_S3", S3
"_Esp A-Corpo No_S1", S1
*Elset, elset="_Esp A-Fundacao A_S3", internal, instance="Esp A-1"
  4,  7,  8,  9, 10, 11
*Elset, elset="_Esp A-Fundacao A_S1", internal, instance="Esp A-1"
 14,
*Surface, type=ELEMENT, name="Esp A-Fundacao A"
"_Esp A-Fundacao A_S3", S3
"_Esp A-Fundacao A_S1", S1
*Elset, elset="_Esp A-Nucleo An_S3", internal, instance="Esp A-1"
 1,
*Elset, elset="_Esp A-Nucleo An_S2", internal, instance="Esp A-1"
 21, 27, 35
*Surface, type=ELEMENT, name="Esp A-Nucleo An"
"_Esp A-Nucleo An_S3", S3
"_Esp A-Nucleo An_S2", S2
*Elset, elset="_Esp B-Fundacao B_S3", internal, instance="Esp B-1"
  1,  4,  6,  9, 10, 13, 14
*Elset, elset="_Esp B-Fundacao B_S1", internal, instance="Esp B-1"
 16, 18
*Elset, elset="_Esp B-Fundacao B_S2", internal, instance="Esp B-1"
 17,
*Surface, type=ELEMENT, name="Esp B-Fundacao B"
"_Esp B-Fundacao B_S3", S3
"_Esp B-Fundacao B_S1", S1
"_Esp B-Fundacao B_S2", S2
*Elset, elset="_Esp B-Nucleo An_S2", internal, instance="Esp B-1"
  3, 30, 39, 42, 57
*Surface, type=ELEMENT, name="Esp B-Nucleo An"
"_Esp B-Nucleo An_S2", S2
*Elset, elset="_Filtro-Corpo No_S1", internal, instance=filtro-1
 1,
*Elset, elset="_Filtro-Corpo No_S2", internal, instance=filtro-1
  3,  5,  7,  9, 11, 13, 15, 18, 19, 27, 29, 31, 33
*Elset, elset="_Filtro-Corpo No_S3", internal, instance=filtro-1
```

```
 2, 22, 23, 26, 28, 29, 30, 32
*Surface, type=ELEMENT, name="Filtro-Corpo No"
"_Filtro-Corpo No_S1", S1
"_Filtro-Corpo No_S2", S2
"_Filtro-Corpo No_S3", S3
*Elset, elset="_Filtro-Fundacao A_S3", internal, instance=filtro-1
 4,  6,  8, 10, 12, 14, 16, 17, 20, 21
*Elset, elset="_Filtro-Fundacao A_S1", internal, instance=filtro-1
 24, 25
*Surface, type=ELEMENT, name="Filtro-Fundacao A"
"_Filtro-Fundacao A_S3", S3
"_Filtro-Fundacao A_S1", S1
*Elset, elset="_Fundacao A-Corpo No_S4", internal, instance="Fundaçao A-1",
generate
 73,  85,   3
*Surface, type=ELEMENT, name="Fundacao A-Corpo No"
"_Fundacao A-Corpo No_S4", S4
*Elset, elset="_Fundacao A-Esp A_S4", internal, instance="Fundaçao A-1",
generate
  88,  106,    3
*Surface, type=ELEMENT, name="Fundacao A-Esp A"
"_Fundacao A-Esp A_S4", S4
*Elset, elset="_Fundacao A-Filtro_S2", internal, instance="Fundaçao A-1",
generate
  3,  39,   3
*Surface, type=ELEMENT, name="Fundacao A-Filtro"
"_Fundacao A-Filtro_S2", S2
*Elset, elset="_Fundacao A-Nucleo An_S3", internal, instance="Fundaçao A-1",
generate
 109,  111,    1
*Elset, elset="_Fundacao A-Nucleo An_S4", internal, instance="Fundaçao A-1"
 109,
*Surface, type=ELEMENT, name="Fundacao A-Nucleo An"
"_Fundacao A-Nucleo An_S3", S3
"_Fundacao A-Nucleo An_S4", S4
*Elset, elset="_Fundacao B-Nucleo An_S3", internal, instance="Fundaçao B-1"
 23,
*Elset, elset="_Fundacao B-Nucleo An_S4", internal, instance="Fundaçao B-1"
  1, 23
*Surface, type=ELEMENT, name="Fundacao B-Nucleo An"
"_Fundacao B-Nucleo An_S3", S3
"_Fundacao B-Nucleo An_S4", S4
*Elset, elset="_Fundacao B-Esp B_S3", internal, instance="Fundaçao B-1",
generate
 24,  33,   1
*Surface, type=ELEMENT, name="Fundacao B-Esp B"
"_Fundacao B-Esp B_S3", S3
*Elset, elset="_Nucleo An-Corpo No_S3", internal, instance=Nucleo-An-1
 21,
*Elset, elset="_Nucleo An-Corpo No_S1", internal, instance=Nucleo-An-1
 23, 33
*Surface, type=ELEMENT, name="Nucleo An-Corpo No"
"_Nucleo An-Corpo No_S3", S3
"_Nucleo An-Corpo No_S1", S1
*Elset, elset="_Nucleo An-Esp A_S3", internal, instance=Nucleo-An-1
```

```
 1,
*Elset, elset="_Nucleo An-Esp A_S2", internal, instance=Nucleo-An-1
 13, 26, 32
*Surface, type=ELEMENT, name="Nucleo An-Esp A"
"_Nucleo An-Esp A_S3", S3
"_Nucleo An-Esp A_S2", S2
*Elset, elset="_Nucleo An-Esp B_S3", internal, instance=Nucleo-An-1
 11,
*Elset, elset="_Nucleo An-Esp B_S2", internal, instance=Nucleo-An-1
 17, 22, 31, 37
*Surface, type=ELEMENT, name="Nucleo An-Esp B"
"_Nucleo An-Esp B_S3", S3
"_Nucleo An-Esp B_S2", S2
*Elset, elset="_Nucleo An-Fundacao A_S4", internal, instance=Nucleo-An-1
 1,
*Elset, elset="_Nucleo An-Fundacao A_S3", internal, instance=Nucleo-An-1
 2, 3
*Surface, type=ELEMENT, name="Nucleo An-Fundacao A"
"_Nucleo An-Fundacao A_S4", S4
"_Nucleo An-Fundacao A_S3", S3
*Elset, elset="_Nucleo An-Fundacao B_S3", internal, instance=Nucleo-An-1
 9,10
*Elset, elset="_Nucleo An-Fundacao B_S2", internal, instance=Nucleo-An-1
 11,
*Surface, type=ELEMENT, name="Nucleo An-Fundacao B"
"_Nucleo An-Fundacao B_S3", S3
"_Nucleo An-Fundacao B_S2", S2
*Elset, elset=__PickedSurf227_S3, internal, instance=Corpo-No-1
   1, 116, 117
*Elset, elset=__PickedSurf227_S1, internal, instance=Corpo-No-1
  13, 127
*Elset, elset=__PickedSurf227_S2, internal, instance=Corpo-No-1
  21,  22, 102, 105, 142
*Surface, type=ELEMENT, name=_PickedSurf227, internal
__PickedSurf227_S3, S3
__PickedSurf227_S1, S1
__PickedSurf227_S2, S2
*Elset, elset=__PickedSurf228_S2, internal, instance="Esp A-1"
  3,  8, 28, 29, 31
*Elset, elset=__PickedSurf228_S3, internal, instance="Esp A-1"
 17, 32, 35
*Elset, elset=__PickedSurf228_S1, internal, instance="Esp A-1"
 25, 26
*Surface, type=ELEMENT, name=_PickedSurf228, internal
__PickedSurf228_S2, S2
__PickedSurf228_S3, S3
__PickedSurf228_S1, S1
*Elset, elset=__PickedSurf229_S3, internal, instance=Corpo-No-1, generate
 2,  6,  2
*Elset, elset=__PickedSurf229_S1, internal, instance=Corpo-No-1
 11, 12
*Surface, type=ELEMENT, name=_PickedSurf229, internal
__PickedSurf229_S3, S3
__PickedSurf229_S1, S1
*Elset, elset=__PickedSurf230_S4, internal, instance="Fundaçao A-1", generate
```

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 73,  85,   3
*Surface, type=ELEMENT, name=_PickedSurf230, internal
__PickedSurf230_S4, S4
*Elset, elset=__PickedSurf231_S3, internal, instance="Esp A-1"
 4,  7,  8,  9, 10, 11
*Elset, elset=__PickedSurf231_S1, internal, instance="Esp A-1"
 14,
*Surface, type=ELEMENT, name=_PickedSurf231, internal
__PickedSurf231_S3, S3
__PickedSurf231_S1, S1
*Elset, elset=__PickedSurf232_S4, internal, instance="Fundaçao A-1", generate
 88,  106,    3
*Surface, type=ELEMENT, name=_PickedSurf232, internal
__PickedSurf232_S4, S4
*Elset, elset=__PickedSurf250_S2, internal, instance="Esp B-1"
 18,
*Elset, elset=__PickedSurf250_S1, internal, instance="Esp B-1"
 19,
*Elset, elset=__PickedSurf250_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf250, internal
__PickedSurf250_S2, S2
__PickedSurf250_S1, S1
__PickedSurf250_S3, S3
*Elset, elset=__PickedSurf251_S2, internal, instance="Esp B-1"
 18, 28
*Elset, elset=__PickedSurf251_S1, internal, instance="Esp B-1"
 19, 29
*Elset, elset=__PickedSurf251_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf251, internal
__PickedSurf251_S2, S2
__PickedSurf251_S1, S1
__PickedSurf251_S3, S3
*Elset, elset=__PickedSurf252_S2, internal, instance="Esp B-1"
 18, 28, 49
*Elset, elset=__PickedSurf252_S1, internal, instance="Esp B-1"
 19, 29, 50
*Elset, elset=__PickedSurf252_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf252, internal
__PickedSurf252_S2, S2
__PickedSurf252_S1, S1
__PickedSurf252_S3, S3
*Elset, elset=__PickedSurf253_S2, internal, instance="Esp B-1"
 18, 28, 49, 55
*Elset, elset=__PickedSurf253_S1, internal, instance="Esp B-1"
 19, 29, 50, 56
*Elset, elset=__PickedSurf253_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf253, internal
__PickedSurf253_S2, S2
__PickedSurf253_S1, S1
__PickedSurf253_S3, S3
*Elset, elset=__PickedSurf255_S2, internal, instance=Corpo-No-1
```

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 88,
*Elset, elset=__PickedSurf255_S2, internal, instance="Esp B-1"
 18, 28, 37, 49, 55
*Elset, elset=__PickedSurf255_S1, internal, instance="Esp B-1"
 19, 29, 38, 39, 50, 56
*Elset, elset=__PickedSurf255_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf255, internal
__PickedSurf255_S2, S2
__PickedSurf255_S1, S1
__PickedSurf255_S3, S3
*Elset, elset=__PickedSurf256_S2, internal, instance=Corpo-No-1
  88, 229
*Elset, elset=__PickedSurf256_S2, internal, instance="Esp B-1"
 18, 28, 37, 49, 55
*Elset, elset=__PickedSurf256_S1, internal, instance="Esp B-1"
 19, 29, 38, 39, 50, 56
*Elset, elset=__PickedSurf256_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf256, internal
__PickedSurf256_S2, S2
__PickedSurf256_S1, S1
__PickedSurf256_S3, S3
*Elset, elset=__PickedSurf257_S2, internal, instance=Corpo-No-1
  88, 229, 245
*Elset, elset=__PickedSurf257_S2, internal, instance="Esp B-1"
 18, 28, 37, 49, 55
*Elset, elset=__PickedSurf257_S1, internal, instance=Corpo-No-1
 246,
*Elset, elset=__PickedSurf257_S1, internal, instance="Esp B-1"
 19, 29, 38, 39, 50, 56
*Elset, elset=__PickedSurf257_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf257, internal
__PickedSurf257_S2, S2
__PickedSurf257_S1, S1
__PickedSurf257_S3, S3
*Elset, elset=__PickedSurf258_S2, internal, instance=Corpo-No-1
  88, 229, 245, 287
*Elset, elset=__PickedSurf258_S2, internal, instance="Esp B-1"
 18, 28, 37, 49, 55
*Elset, elset=__PickedSurf258_S1, internal, instance=Corpo-No-1
 246, 288
*Elset, elset=__PickedSurf258_S1, internal, instance="Esp B-1"
 19, 29, 38, 39, 50, 56
*Elset, elset=__PickedSurf258_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf258, internal
__PickedSurf258_S2, S2
__PickedSurf258_S1, S1
__PickedSurf258_S3, S3
*Elset, elset=__PickedSurf259_S2, internal, instance=Corpo-No-1
  88, 229, 245, 287, 297
*Elset, elset=__PickedSurf259_S2, internal, instance="Esp B-1"
 18, 28, 37, 49, 55
```

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*Elset, elset=__PickedSurf259_S1, internal, instance=Corpo-No-1
 246, 288, 298
*Elset, elset=__PickedSurf259_S1, internal, instance="Esp B-1"
 19, 29, 38, 39, 50, 56
*Elset, elset=__PickedSurf259_S3, internal, instance="Fundaçao B-1", generate
 34,  44,   1
*Surface, type=ELEMENT, name=_PickedSurf259, internal
__PickedSurf259_S2, S2
__PickedSurf259_S1, S1
__PickedSurf259_S3, S3
** Constraint: Constraint-1
*Tie, name=Constraint-1, adjust=yes
_PickedSurf228, _PickedSurf227
** Constraint: Constraint-10
*Tie, name=Constraint-10, adjust=yes
"Filtro-Fundacao A", "Fundacao A-Filtro"
** Constraint: Constraint-11
*Tie, name=Constraint-11, adjust=yes
"Nucleo An-Fundacao B", "Fundacao B-Nucleo An"
** Constraint: Constraint-2
*Tie, name=Constraint-2, adjust=yes
"Filtro-Corpo No", "Corpo No-Filtro"
** Constraint: Constraint-3
*Tie, name=Constraint-3, adjust=yes
_PickedSurf230, _PickedSurf229
** Constraint: Constraint-4
*Tie, name=Constraint-4, adjust=yes
"Nucleo An-Corpo No", "Corpo No-Nucleo An"
** Constraint: Constraint-5
*Tie, name=Constraint-5, adjust=yes
_PickedSurf232, _PickedSurf231
** Constraint: Constraint-6
*Tie, name=Constraint-6, adjust=yes
"Nucleo An-Esp A", "Esp A-Nucleo An"
** Constraint: Constraint-7
*Tie, name=Constraint-7, adjust=yes
"Esp B-Fundacao B", "Fundacao B-Esp B"
** Constraint: Constraint-8
*Tie, name=Constraint-8, adjust=yes
"Esp B-Nucleo An", "Nucleo An-Esp B"
** Constraint: Constraint-9
*Tie, name=Constraint-9, adjust=yes
"Nucleo An-Fundacao A", "Fundacao A-Nucleo An"
*End Assembly
** AS restrições devem ser prescritas nas superfícies de interação do problema,
a cada vez que usamos o modulo interaction
*Amplitude, name=Amp-1, smooth=0.25
  0.02 ,   0.097620 ,  0.04 ,   0.017170 ,  0.06 ,  -0.017100 ,  0.08 ,  -0.041830 ,
  0.10 ,  -0.009010 ,  0.12 ,   0.026500 ,  0.14 ,   0.059050 ,  0.16 ,  -0.006180 ,
  0.18 ,  -0.042810 ,  0.20 ,  -0.012170 ,  0.22 ,   0.015880 ,  0.24 ,  -0.005590 ,
  0.26 ,   0.113910 ,  0.28 ,   0.034140 ,  0.30 ,  -0.181840 ,  0.32 ,  -0.078510 ,
   .....
.....
 97.78 ,  -0.008430 , 97.80 ,   0.017450 , 97.82 ,  -0.002450 , 97.84 ,  -0.051110 ,
 97.86 ,  -0.056100 , 97.88 ,  -0.011610 , 97.90 ,  -0.003870 , 97.92 ,  -0.034820 ,
```

97.94 , -0.048050 , 97.96 , -0.020940 , 97.98 , 0.000320 , 98.00 , 0.004900 ,
98.10 , 0.00
** Os dados anteriores correspondem ao registro sísmico (Acelerograma) e
devem ser fornecidos antes das propriedades dos materiais.
*Baseline Correction
**
** MATERIALS
**
*Material, name=Corpo-No
*Damping, alpha=0.02, beta=0.02
*Density
2040.85,
*Elastic
2.3e+07, 0.32
*Mohr Coulomb, deviatoric Eccentricity =0.71428
30.,30.
*Mohr Coulomb Hardening
20000.,0.
*Material, name="Esp A"
*Damping, alpha=0.02, beta=0.02
*Density
2142.85,
*Elastic
2.2e+07, 0.333
*Mohr Coulomb, deviatoric Eccentricity =0.71428
30.,30.
*Mohr Coulomb Hardening
10000.,0.
*Material, name="Esp B"
*Damping, alpha=0.02, beta=0.02
*Density
2142.85,
*Elastic
2.2e+07, 0.333
*Mohr Coulomb, deviatoric Eccentricity =0.71428
30.,30.
*Mohr Coulomb Hardening
10000.,0.
*Material, name=Filtro
*Damping, alpha=0.02, beta=0.02
*Density
2142.85,
*Elastic
2.2e+07, 0.32
*Mohr Coulomb, deviatoric Eccentricity =0.71428
30.,30.
*Mohr Coulomb Hardening
20000.,0.
*Material, name="Fundacao A"
*Damping, alpha=0.02, beta=0.02
*Density
2142.85,
*Elastic
2.5e+07, 0.333
*Mohr Coulomb, deviatoric Eccentricity =0.71428

```
30.,30.
*Mohr Coulomb Hardening
15000.,0.
*Material, name="Fundacao B"
*Damping, alpha=0.02, beta=0.02
*Density
 2142.85,
*Elastic
 2.5e+07, 0.333
*Mohr Coulomb, deviatoric Eccentricity =0.71428
30.,30.
*Mohr Coulomb Hardening
15000.,0.
*Material, name=Nucleo-An
*Damping, alpha=0.02, beta=0.02
*Density
 2040.81,
*Elastic
 2e+07, 0.347
*Mohr Coulomb, deviatoric Eccentricity =0.73714
27.,27.
*Mohr Coulomb Hardening
30000.,0.
**
*Initial Conditions, type=stress, geostatic
_PickedSet233,-420000,0,0,20,0.4
**
*Initial Conditions, type=stress, geostatic
_PickedSet235,-210000,10,0,20,0.4
**
** Para os elementos infinitos os valores das tensões iniciais correspondem a
tensões geostáticas
** Neste tipo de problema (dinâmico) é comum as condições de contorno serem
prescritas no módulo history
** STEP: Step-1
**
*Step, name=Step-1, unsymm=YES
Funda e C1
*Geostatic
**
*Model Change, remove, type=element
_PickedSet236,_PickedSet237,_PickedSet238,_PickedSet239,
_PickedSet240,_PickedSet241,_PickedSet242,_PickedSet243,
_PickedSet244,_PickedSet245,_PickedSet246,_PickedSet247,
_PickedSet248,_PickedSet249
**
** O comando anterior permite executar o processo de construção incremental
na barragem, oseja ativando e desativando elementos na malha de elementos
finitos.
** BOUNDARY CONDITIONS
**
** Name: BC-1 Type: Displacement/Rotation
*Boundary
_PickedSet260, 1, 1
_PickedSet260, 2, 2
```

```
**
** LOADS
**
** Name: Load 1A   Type: Gravity
*Dload
_PickedSet233, GRAV, 9.81, 0., -1.
** Name: Load-1   Type: Gravity
*Dload
_PickedSet234, GRAV, 9.81, 0., -1.
** Name: Load-1B   Type: Gravity
*Dload
_PickedSet235, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*El Print, freq=900
S,EE,
PE,PEEQ
*Node Print, freq=900
coor1, coor2, u1, u2, A1, A2
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-2
**
*Step, name=Step-2, unsymm=YES
C2-An
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet236
**
** LOADS
**
** Name: Load-2   Type: Gravity
*Dload
_PickedSet236, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
```

```
** FIELD OUTPUT: F-Output-1, F-Output-2
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-3
**
*Step, name=Step-3, unsymm=YES
C3-An
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet237
**
** LOADS
**
** Name: Load-3   Type: Gravity
*Dload
_PickedSet237, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-2, F-Output-3
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-4
**
*Step, name=Step-4, unsymm=YES
C4-An
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet238
```

```
**
** LOADS
**
** Name: Load-4   Type: Gravity
*Dload
_PickedSet238, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-2, F-Output-3, F-Output-4
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-5
**
*Step, name=Step-5, unsymm=YES
C5-An
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet239
**
** LOADS
**
** Name: Load-5   Type: Gravity
*Dload
_PickedSet239, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-2, F-Output-3, F-Output-4, F-Output-5
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
```

```
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-6
**
*Step, name=Step-6, unsymm=YES
C1-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet240
**
** LOADS
**
** Name: Load-6   Type: Gravity
*Dload
_PickedSet240, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-2, F-Output-3, F-Output-4, F-Output-5,
F-Output-6
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-7
**
*Step, name=Step-7, unsymm=YES
C2-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet241
**
** LOADS
**
** Name: Load-7   Type: Gravity
*Dload
_PickedSet241, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
```

```
**
** FIELD OUTPUT: F-Output-1, F-Output-2, F-Output-3, F-Output-4, F-Output-5,
F-Output-6, F-Output-7
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-8
**
*Step, name=Step-8, unsymm=YES
C3-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet242
**
** LOADS
**
** Name: Load-8   Type: Gravity
*Dload
_PickedSet242, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-2, F-Output-3, F-Output-4, F-Output-5,
F-Output-6, F-Output-7, F-Output-8
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-9
**
*Step, name=Step-9, unsymm=YES
C4-No
*Geostatic
```

```
**
*Model Change, ADD=strain free, type=element
_PickedSet243
**
** LOADS
**
** Name: Load-9   Type: Gravity
*Dload
_PickedSet243, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-2, F-Output-3, F-Output-4, F-Output-5,
F-Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-10
**
*Step, name=Step-10, unsymm=YES
C5-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet244
**
** LOADS
**
** Name: Load-10   Type: Gravity
*Dload
_PickedSet244, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-2, F-Output-3, F-Output-4,
F-Output-5, F-Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
```

```
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-11
**
*Step, name=Step-11, unsymm=YES
C6-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet245
**
** LOADS
**
** Name: Load-11   Type: Gravity
*Dload
_PickedSet245, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-2, F-Output-
3, F-Output-4, F-Output-5, F-Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-12
**
*Step, name=Step-12, unsymm=YES
C7-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet246
**
** LOADS
**
** Name: Load-12   Type: Gravity
*Dload
```

```
_PickedSet246, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-2, F-Output-3, F-Output-4, F-Output-5, F-Output-6, F-Output-7, F-Output-
8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-13
**
*Step, name=Step-13, unsymm=YES
C8-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet247
**
** LOADS
**
** Name: Load-13   Type: Gravity
*Dload
_PickedSet247, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-2, F-Output-3, F-Output-4, F-Output-5, F-Output-6, F-
Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
```

```
** ----------------------------------------------------------------
**
** STEP: Step-14
**
*Step, name=Step-14, unsymm=YES
C9-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet248
**
** LOADS
**
** Name: Load-14   Type: Gravity
*Dload
_PickedSet248, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-2, F-Output-3, F-Output-4, F-Output-5, F-
Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-15
**
*Step, name=Step-15, unsymm=YES
C10-No
*Geostatic
**
*Model Change, ADD=strain free, type=element
_PickedSet249
**
** LOADS
**
** Name: Load-15   Type: Gravity
*Dload
_PickedSet249, GRAV, 9.81, 0., -1.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
```

```
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-2, F-Output-3, F-Output-4, F-
Output-5, F-Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-16
**
*Step, name=Step-16, unsymm=YES
water 1
*Geostatic
**
** LOADS
**
** Name: Load-16   Type: Pressure
*Dsload
_PickedSurf250, HP, 40000., 24., 20.
**
** O comando anterior representa o valor de carga hidrostática, na simulação
incremental do enchimento do reservatório.
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-2, F-Output-3, F-
Output-4, F-Output-5, F-Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-17
**
*Step, name=Step-17, unsymm=YES
water 2
```

```
*Geostatic
**
** LOADS
**
** Name: Load-16   Type: Pressure
*Dsload, op=NEW
** Name: Load-17   Type: Pressure
*Dsload, op=NEW
_PickedSurf251, HP, 80000., 28., 20.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-2, F-
Output-3, F-Output-4, F-Output-5, F-Output-6, F-Output-7, F-Output-8, F-Output-
9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-18
**
*Step, name=Step-18, unsymm=YES
water 3
*Geostatic
**
** LOADS
**
** Name: Load-17   Type: Pressure
*Dsload, op=NEW
** Name: Load-18   Type: Pressure
*Dsload, op=NEW
_PickedSurf252, HP, 120000., 32., 20.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-18, F-
Output-2, F-Output-3, F-Output-4, F-Output-5, F-Output-6, F-Output-7, F-Output-
8, F-Output-9
**
*Output, field
```

```
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-19
**
*Step, name=Step-19, unsymm=YES
water 4
*Geostatic
**
** LOADS
**
** Name: Load-18   Type: Pressure
*Dsload, op=NEW
** Name: Load-19   Type: Pressure
*Dsload, op=NEW
_PickedSurf253, HP, 160000., 36., 20.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-18, F-
Output-19, F-Output-2, F-Output-3, F-Output-4, F-Output-5, F-Output-6, F-
Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-20
**
*Step, name=Step-20, unsymm=YES
water 5
*Geostatic
**
** LOADS
**
** Name: Load-19   Type: Pressure
```

```
*Dsload, op=NEW
** Name: Load-20   Type: Pressure
*Dsload, op=NEW
_PickedSurf255, HP, 215000., 41.5, 20.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-18, F-
Output-19, F-Output-2, F-Output-20, F-Output-3, F-Output-4, F-Output-5, F-
Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-21
**
*Step, name=Step-21, unsymm=YES
water 6
*Geostatic
**
** LOADS
**
** Name: Load-20   Type: Pressure
*Dsload, op=NEW
** Name: Load-21   Type: Pressure
*Dsload, op=NEW
_PickedSurf256, HP, 240000., 44., 20.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-18, F-
Output-19, F-Output-2, F-Output-20, F-Output-21, F-Output-3, F-Output-4, F-
Output-5, F-Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
```

```
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-22
**
*Step, name=Step-22, unsymm=YES
water 7
*Geostatic
**
** LOADS
**
** Name: Load-21   Type: Pressure
*Dsload, op=NEW
** Name: Load-22   Type: Pressure
*Dsload, op=NEW
_PickedSurf257, HP, 280000., 48., 20.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-18, F-
Output-19, F-Output-2, F-Output-20, F-Output-21, F-Output-22, F-Output-3, F-
Output-4, F-Output-5, F-Output-6, F-Output-7, F-Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-23
**
*Step, name=Step-23, unsymm=YES
water 8
*Geostatic
**
** LOADS
**
** Name: Load-22   Type: Pressure
*Dsload, op=NEW
** Name: Load-23   Type: Pressure
*Dsload, op=NEW
_PickedSurf258, HP, 320000., 52., 20.
**
```

```
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-18, F-
Output-19, F-Output-2, F-Output-20, F-Output-21, F-Output-22, F-Output-23, F-
Output-3, F-Output-4, F-Output-5, F-Output-6, F-Output-7, F-Output-8, F-Output-
9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-24
**
*Step, name=Step-24, unsymm=YES
water 9
*Geostatic
**
** LOADS
**
** Name: Load-23   Type: Pressure
*Dsload, op=NEW
** Name: Load-24   Type: Pressure
*Dsload, op=NEW
_PickedSurf259, HP, 360000., 56., 20.
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-18, F-
Output-19, F-Output-2, F-Output-20, F-Output-21, F-Output-22, F-Output-23, F-
Output-24, F-Output-3, F-Output-4, F-Output-5, F-Output-6, F-Output-7, F-
Output-8, F-Output-9
**
*Output, field
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
```

```
*End Step
** ----------------------------------------------------------------
**
** STEP: Step-25
**
*Step, name=Step-25, inc=15000, unsymm=YES
Analisis Dinamico
*Dynamic,alpha=-0.05,direct
0.1,98.1,0.00098,0.2
**
**O comando anterior representa a aplicação do envento sísmico na base da
barragem.
** BOUNDARY CONDITIONS
**
** Name: BC-1 Type: Displacement/Rotation
*Boundary, op=NEW
** Name: BC-2 Type: Acceleration/Angular acceleration
*Boundary, op=NEW, type=ACCELERATION,amplitude=Amp-1
_PickedSet261, 1, 1, 1
_PickedSet261, 2, 2
**
** OUTPUT REQUESTS
**
*Restart, write, frequency=1
**
** FIELD OUTPUT: F-Output-1, F-Output-10, F-Output-11, F-Output-12, F-
Output-13, F-Output-14, F-Output-15, F-Output-16, F-Output-17, F-Output-18, F-
Output-19, F-Output-2, F-Output-20, F-Output-21, F-Output-22, F-Output-23, F-
Output-24, F-Output-3, F-Output-4, F-Output-5, F-Output-6, F-Output-7, F-
Output-8, F-Output-9
**
*Output, field, frequency=1
*Node Output
U,
*Element Output
S, E, PE, PEEQ
**
** FIELD OUTPUT: F-Output-25
**
*Output, field
*Node Output
U, A
*Element Output
S, E, PE, PEEQ
**
** HISTORY OUTPUT: H-Output-1
**
*Output, history, variable=PRESELECT
*End Step
```