**NODES CIRCLE** command

**Synopsis**

The **NODES CIRCLE** command is included in the APES computer program to facilitate the generation of nodal coordinates along a circular arc in the plane or in space.

**Syntax**

The following syntax is associated with the **NODES CIRCLE** command:

```
NODEs CIRcle NUMber ## X1 #.# X2 #.# ( X3 #.# )
  INCrement ## RATio #.#
  ( X1_intermediate #.# ) ( X2_intermediate #.# ) ( X3_intermediate #.# )
```

**Explanatory Notes**

The **NUMBER** keyword denotes the node number at which the coordinate generation will stop (the beginning point for the generation is the node **NUMBER** specified on the previous **NODES CIRCLE** or **NODES LINE** record). The keyword **INCREMENT** is used to specify the numbering increment to be used in generating the nodal coordinates. The default numbering increment is equal to zero (0). The spacing of the generated nodes is dictated by the real number supplied in conjunction with the **RATIO** keyword. The default spacing ratio is equal to 1.0. The values for **X1_INTERMEDIATE**, **X2_INTERMEDIATE** and **X3_INTERMEDIATE** represent the coordinates of an intermediate point through which the circular arc passes. This point need not be a node associated with the mathematical model. The default coordinates for **X1**, **X2** and **X3** are zero (0.0). As such, if a specific coordinate is equal to zero, the analyst need not supply the value explicitly.
Example of Command Usage

To better illustrate the use of the `NODES CIRCLE` command, consider the generation of nodes along a circular arc that begins at node 2 and ends at node 44 (Figure 1). The numbering increment is equal to 7, and a spacing RATIO of 1.0 is adopted. The coordinates of the intermediate point are (4.0, 4.745). The two command lines required to generate these nodes are thus

```
nodes line num 2 x1 6.0 x2 -4.0

nodes circle num 44 x1 -4.0 x2 6.0 incr 7 &
x1_int 4.0 x2_int 4.745
```

![Figure 1: Example of Nodal Generation Along Circular Arc (Spacing Ratio = 1.0)](image)

The above example of nodal generation is repeated, only assuming a spacing ratio of 0.80. The resulting arc of nodes is shown in Figure 2.
Figure 2: Example of Nodal Generation Along Circular Arc (Spacing Ratio = 0.8)