SPECIFICATION LINE LINEAR commands

Synopsis

The information supplied in conjunction with the SPECIFICATION LINE LINEAR commands allows the user to specify distributed normal and shear traction and fluid flow acting along a straight LINE. Concentrated nodal values equivalent to the distributed quantities are then automatically computed by the APES computer program.

The SPECIFICATION LINE LINEAR commands can be used to apply a linearly varying normal and/or tangential distribution to the following linear elements:

- Two-node line (bar) elements (L2P0, L2FDP0).
- Three- and four-node triangles\(^1\) (T3P0, T4P3c).
- Four- and five-node quadrilateral elements (Q4P0, Q4P1d, Q4P4c, Q5P4c, QM6).

If a quantity is specified over several nodes in a sequence, then this specification can be generated with a single input record. This is achieved by supplying, on this record, a proper range (beginning node number, ending node number, and numbering increment) of NODE numbers. In addition, suitable HISTORY function numbers must also be specified; these histories are used in applying the equivalent nodal loads computed by APES.

To be consistent with the order of node numbering employed in defining the element topology (refer to the descriptions of the ELEMENT and GENERATE SURFACES commands), during specification of a distributed quantity along a line, the order in which nodes are specified affects the sign of the resulting equivalent nodal loads [?]. For example, a quantity normal to an edge is assumed to be positive if the nodes are specified in a counterclockwise manner and the normal quantity is directed into the element. A tangential quantity is assumed to be positive if it acts in a counterclockwise direction with respect to the loaded element (Figure ??). Such definitions are necessary in order to avoid confusion when distributed loads are specified along the interface between two elements, such as that shown in Figure ??). In this figure the line loads, if they are assumed to act on element 1, are considered to be positive; if they are taken as acting on element 2, these same loads are negative.

\(^1\)Possibly created as degenerate four-node quadrilaterals.
Figure 1: Positive Normal and Tangential Distributed Line Loads Applied to a Linear Element

Figure 2: Loads Specified Along an Interface Common to Two Elements
References