**ELEMENT SCALAR**

**Synopsis:**
The **ELEMENT SCALAR** commands are used to describe all irreducible continuum elements that are to be used in analyses involving scalar primary dependent variables (e.g., temperature).

**Syntax:**

```
ELEMENT SCAlar TYPE [ QS4 | LS2 | QS8 | QS9 | HS8 | TETS4 | TS3 ] NODEs #::# ( DEScription "string")
          ( SCAlar ##) ( INTcode ##)
          ( THIckness #.#)
          ( 1_Additional ##) ( 1_Increment ##)
          ( 2_Additional ##) ( 2_Increment ##)
          ( 3_Additional ##) ( 3_Increment ##)
          ( DONT_PRINT_Results)
```

**Explanatory Remarks:**
The numbering order of NODES associated with the SCALAR elements is shown below. For QS4 elements the numbers \( n_1 \) to \( n_4 \) must be specified sequentially; for QS8 elements the numbers \( n_1 \) to \( n_8 \) must be specified sequentially; finally, for QS9 elements the numbers \( n_1 \) to \( n_9 \) must be specified sequentially.

![Node Numbering](image)

*Node Numbering Associated with Typical 4- to 9-Node Irreducible Quadrilateral Element for Scalar Analyses*
To degenerate the quadrilateral to a triangular element, specify the fourth node number equal to the first. Alternately, a true linear triangle, the TS3 element, is also available. The node numbers associated with this element must be specified in a counterclockwise manner (see figure below).

![Node Numbering Associated with Typical 3-Node Irreducible Triangular Element for Scalar Analyses](image)

For hexahedral HS8 elements such as that shown below, the nodes the numbers n₁ to n₈ must be specified sequentially.

![Node Numbering Associated with Typical 8-Node Irreducible Hexahedral Element for Scalar Analyses](image)
Finally, for tetrahedral TETS4 elements such as that shown below, the nodes the numbers $n_1$ to $n_4$ must be specified sequentially.

![Node Numbering Associated with Typical 4-Node Irreducible Tetrahedral Element for Scalar Analyses](image)

The SCALAR keyword is used to specify the number of the material parameter (e.g., thermal conductivity) idealization associated with the element. The default values for the SCALAR number is one (1).

The value specified in conjunction with the INTCODE keyword describes the order of numerical integration scheme to be used in developing the element equations for the element(s). The following values are associated with this command:

- 0: the ‘commonly used’ value for the particular element
- 1: one-point Gauss-Legendre integration scheme
- 2: two-point Gauss-Legendre integration scheme
- 3: three-point Gauss-Legendre integration scheme
- 4: two-point Newton-Cotes/Lobatto integration scheme
- 5: three-point Newton-Cotes/Lobatto integration scheme

The default INTCODE value is zero (0).

The THICKNESS keyword is used to specify the material thickness assumed for the element. Over a given element, the thickness is assumed to be constant. The default THICKNESS value is equal to one (1.0). For AXISYMMETRIC and PLANE STRAIN idealizations, the THICKNESS must be equal to 1.0. For such idealizations, specified values different from 1.0 are ignored and the proper value is used.

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Specification of the keyword **DONT_PRINT_Results** indicates that the analyst does not desire to see output (fluxes) for this element. If generation is performed using the **ELEMENT SCALAR** command, then all the elements generated will be affected in a like manner by the above print control commands.

**Example:**

The twenty element mesh shown below consists entirely of four-node quadrilateral elements possessing the same material (number 2). Since the nodes are numbered in a consistent manner, generation of all the elements is realized by entering the following command:

```
  element scalar type "qs4" nodes 1 6 7 2  scalar 2 &
  1_add 4 1_incr 5 2_add 3 2_incr 1
```

In words, the nodes associated with the first element are input (in a counterclockwise order). Four additional elements are to be generated in the “1” direction, with a numbering increment of 5 between corresponding nodes. Three additional layers of elements are to be generated, with a numbering increment of 1 between corresponding nodes.
See also:
The SCALAR CONDUCTIVITY commands.