
AV3D4

This command is used to construct a four-node 3D acoustic viscous boundary quad element object based on a bilinear isoparametric formulation.

elementAV3D4 \$eleTag \$node1 \$node2 \$node3 \$node4 \$matTag

\$eleTag unique element object tag
\$node1 - \$node4 four nodes defining element boundaries
\$matTag tag associated with previously-defined nDMaterial object

Formulation:

The formulation of the viscous boundary is expressed as

$$\frac{\partial p}{\partial n} = \frac{1}{c} \dot{p} \quad (1)$$

The discretized finite element equation is expressed as

$$\{F\} = [C]\{\dot{p}\} \quad (2)$$

with the damping matrix $[C]$ defined as

$$[C] = \frac{1}{\rho c} \int_V [N]^T [N] dV \quad (3)$$

where $[N]$ are the shape function of elements; ρ and c are the mass density and sound wave velocity in acoustic fluid.

Reference

1. Liu J, Du Y, Du X, et al. 3D viscous-spring artificial boundary in time domain. Earthquake Engineering and Engineering Vibration, 2006, 5(1):93-102
2. Y. Gao, Q. Gu, Z. Qiu, Sensitivity Analysis for Seismic Responses of Coupled Dam-Reservoir-Foundation Systems, ASCE Journal of Engineering Mechanics, under preparation.