

Discrete Beam Axis Systems

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For a discrete beam (ELFORM=6) the coordinate system is defined on the *SECTION_BEAM card using the CID option.

```
*SECTION_BEAM
      1      6      0.0      0.0      0.0     -3.0      0.0
    100.0      0.0      1      0.0      0.0      0.0      0.0      0.0
```

How this axis system updates during the analysis is controlled by the SCOOR option on the *SECTION_BEAM card.

```
*SECTION_BEAM
      1      6      0.0      0.0      0.0     -3.0      0.0
    100.0      0.0      1      0.0      0.0      0.0      0.0      0.0
```

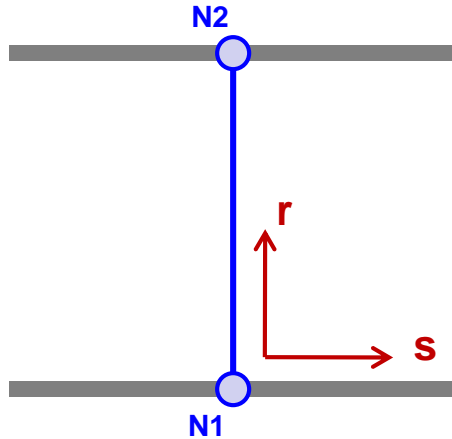
SCOOR

Location of triad for tracking the rotation of the discrete beam element, see the parameter CID below. The force and moment resultants in the output databases are referenced to this triad. The flags -3.0, -1.0, 0.0, 1.0, and 3.0 are inactive if the option to update the local system is active in the CID definition.

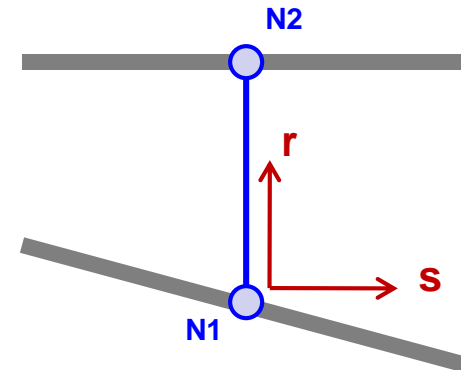
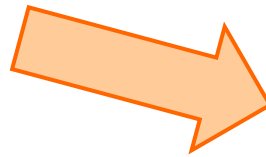
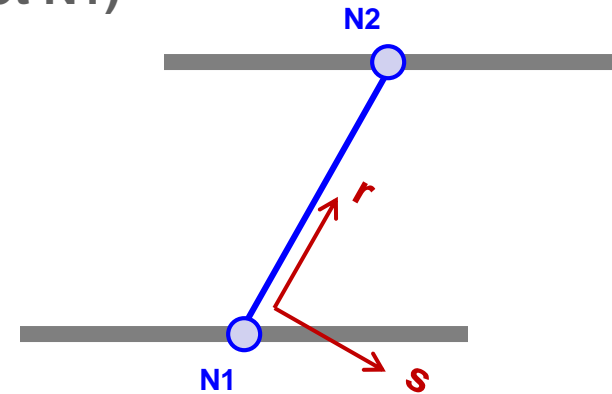
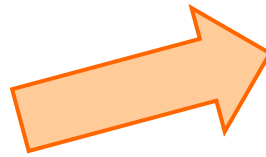
- EQ.-3.0: beam node 1, the angular velocity of node 1 rotates triad,
- EQ.-2.0: beam node 1, the angular velocity of node 1 rotates triad but the r-axis is adjusted to lie along the line between the two beam nodal points. This option is not recommended for zero length discrete beams.,
- EQ.-1.0: beam node 1, the angular velocity of node 1 rotates triad,
- EQ. 0.0: centered between beam nodes 1 and 2, the average angular velocity of nodes 1 and 2 is used to rotate the triad,
- EQ.+1.0: beam node 2, the angular velocity of node 2 rotates triad.
- EQ.+2.0: beam node 2, the angular velocity of node 2 rotates triad. but the r-axis is adjusted to lie along the line between the two beam nodal points. This option is not recommended for zero length discrete beams.
- EQ.+3.0: beam node 2, the angular velocity of node 2 rotates triad.

If the magnitude of SC00R is less than or equal to unity then zero length discrete beams are assumed with infinitesimal separation between the nodes in the deformed state. For large separations or nonzero length beams set |SCOOR| to 2 or 3.

For a non zero length beam the SCOOR = -3, -2, 2, or 3 options should be used.
SCOOR = -2 (2 is the same but centred on N2 not N1)

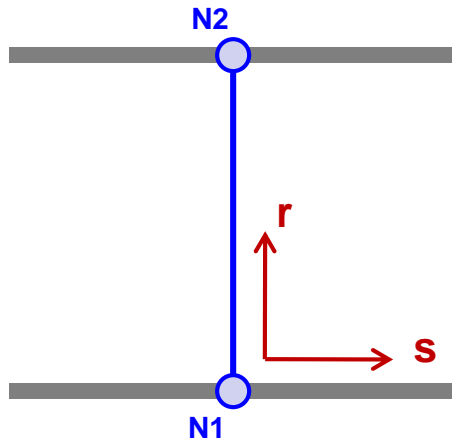


Initial State

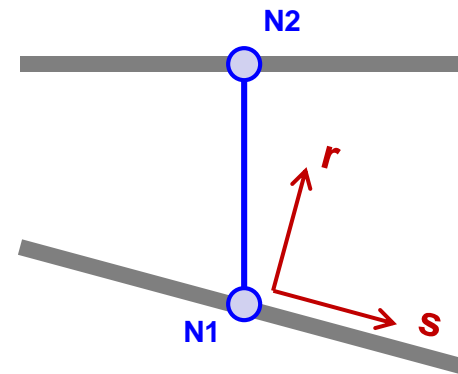
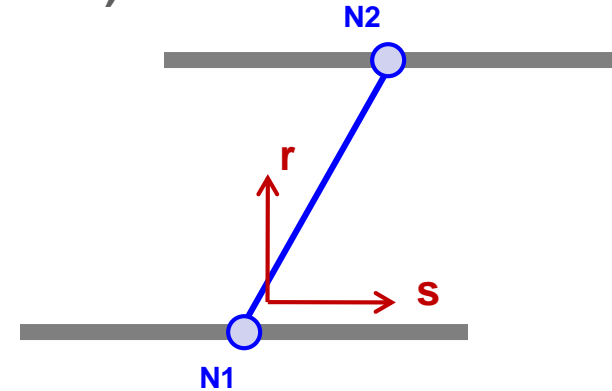
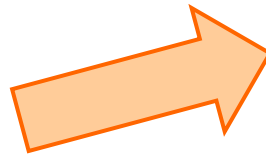


Deformed State

SCOOR = -3 (3 is the same but centred on N2 not N1)

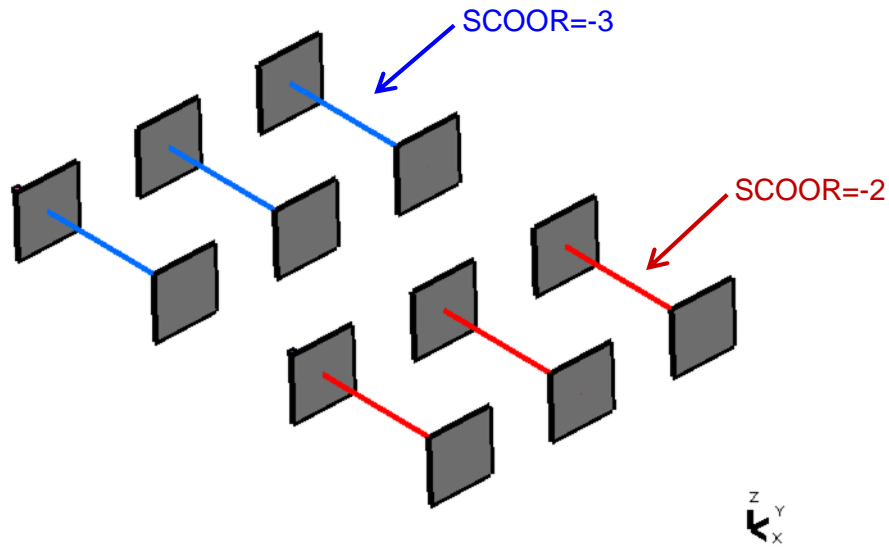


Initial State

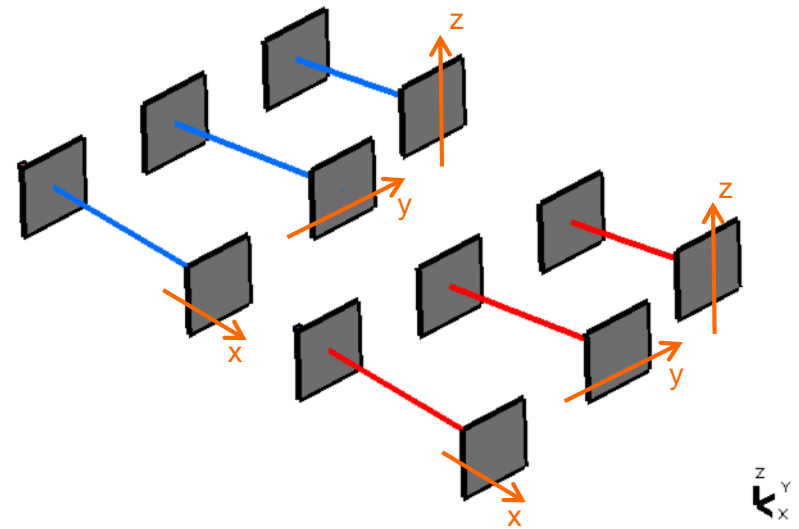


Deformed State

One set of beams has $\text{SCOOR}=-3$ and the other set has $\text{SCOOR}=-2$. A beam from each set is then displaced in the x, y and z axis

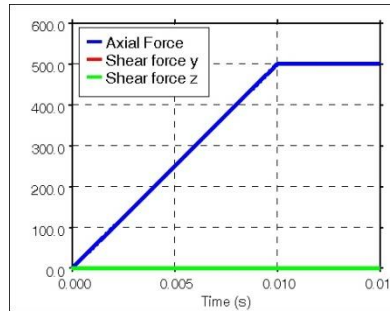


Initial State

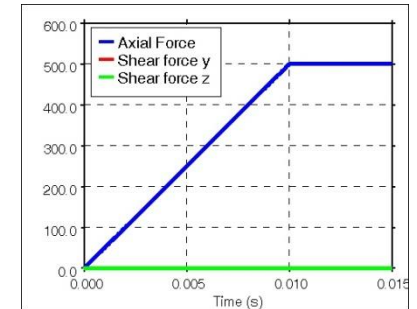


Deformed State

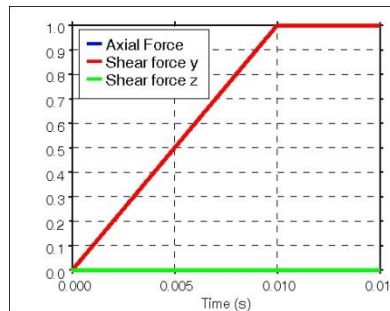
X Displacement
SCORR = -3



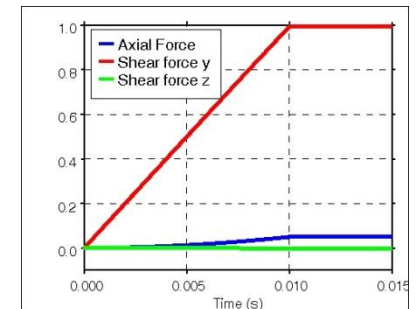
X Displacement
SCORR = -2



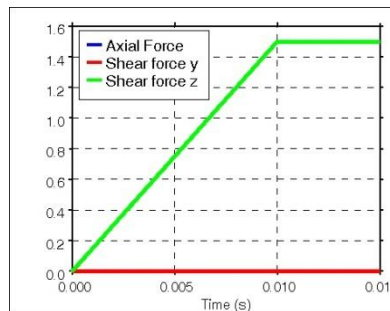
Y Displacement
SCORR = -3



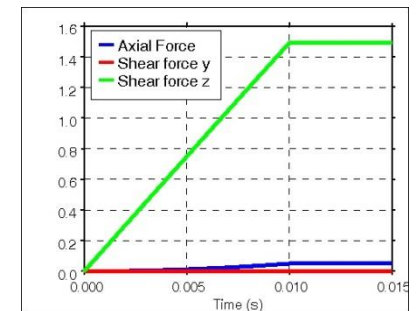
Y Displacement
SCORR = -2



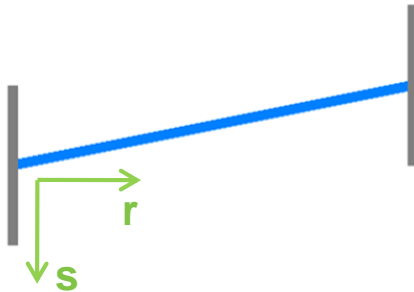
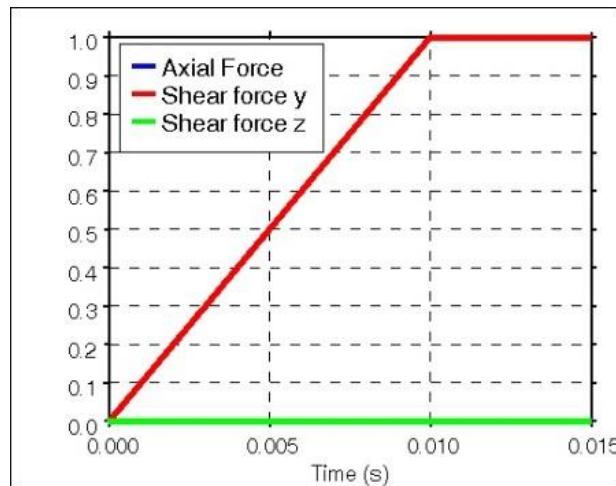
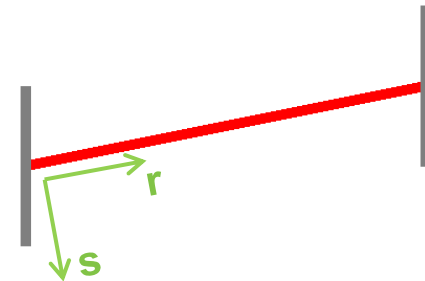
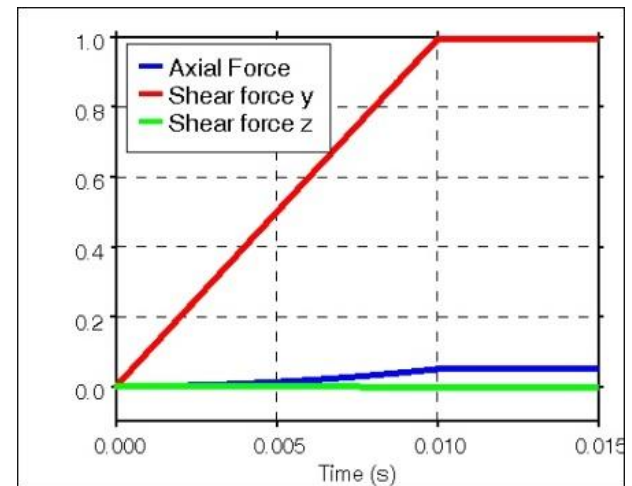
Z Displacement
SCORR = -3



Z Displacement
SCORR = -2



In the case of the y or z shear loading it can be seen that as the beam rotates with $\text{SCOOR}=-3$ no axial force is generated whereas with $\text{SCOOR}=-2$ a force is generated.

SCOOR = -3**SCOOR = -2**



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