Truss

Truss members are modeled in CSI Software using frame objects which are assigned end releases. A designated truss member is not available to modeling because CSI strives to keep the interface and controls simple and practical, using fewer objects and features which are more versatile. Hence frame objects are suitable to represent truss members.

Modeling a truss member

To model a truss member, draw a frame object without end or joint offsets, then assign M2 and M3 releases to both ends, and a torsional release to one end. When multiple truss members are connected to form a truss system, end releases should be coordinated to prevent numerical instability.

An alternative modeling technique, which eliminates the need to specify end releases for each member, is to make only translational degrees-of-freedom (DOF) available to analysis by selecting Space Truss from the Analysis Options menu, available through Analyze > Set Analysis Options > Set Solver. Space Truss and Space Frame are compared in the Joint DOF article.

Truss stability

Stability considerations which must be taken into account when modeling truss systems include:

1. Stability is dependent upon the load carrying capacity of members.

   Distributed loading (including self weight) must not be applied to truss members because they are released from flexural capacity, and are therefore unable to resist the moments generated by distributed loading. When distributed load is applied to a truss member, moment will find no reaction, and a condition of instability will arise. By providing translational stiffness, and not rotational stiffness, truss members transfer load only through axial behavior. Only concentrated point loads should be applied to the nodes at either end of a truss member.
2. Stability is dependent upon the relationship between truss geometry and support conditions

   The structural system must be statically determinate such that equilibrium conditions are maintained, and numerical formulation may resolve internal forces and external reactions. A 2D truss is statically determinate when:

m 2j - r where:

m = truss members

j = joints

r = reactions

Before interpreting results, verify stability conditions by checking for instability warnings in the log file, available through File > Show Input Log Files.

See Also

- Frame FAQ
- Joint DOF