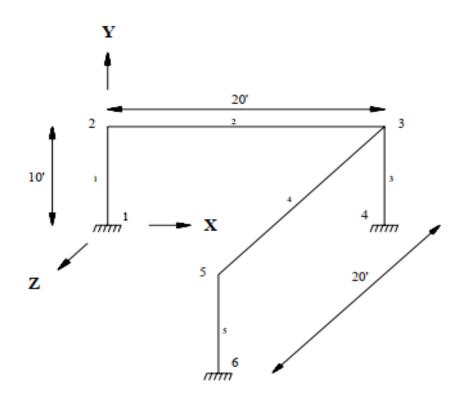


# Example Problem No. 5

This example demonstrates the application of support displacement load (commonly known as sinking support) on a space frame structure.



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Actual input is shown in bold lettering followed by explanation.

## STAAD SPACE TEST FOR SUPPORT DISPLACEMENT

Every input has to start with the word STAAD. The word SPACE signifies that the structure is a space frame structure (3-D) and the geometry is defined through X, Y and Z coordinates.

#### UNITS KIP FEET

Specifies the unit to be used for data to follow.

#### JOINT COORDINATES

1 0.0 0.0 0.0 ; 2 0.0 10.0 0.0 3 20.0 10.0 0.0 ; 4 20.0 0.0 0.0 5 20. 10. 20. ; 6 20. 0. 20.

Joint number followed by X, Y and Z coordinates are provided above. Semicolon signs (;) are used as line separators. That enables us to provide multiple sets of data on one line.

#### MEMBER INCIDENCE

1 1 2 3 4 3 5 ; 5 5 6

Defines the members by the joints they are connected to.

UNIT INCH MEMB PROP 1 TO 5 PRIS AX 10. IZ 300. IY 300. IX 10.

Member properties have been defined above using the PRISMATIC attribute. Values of AX (area), IZ (moment of inertia about major axis), IY (moment of inertia about minor axis) and IX (torsional constant) are provided in INCH unit.

CONSTANT E 29000. ALL POISSON STEEL ALL

Material constants like E (modulus of elasticity) and Poisson's ratio are specified following the command CONSTANTS.



# SUPPORT 1 4 6 FIXED

Joints 1, 4 and 6 are fixed supports.

# LOADING 1 SINKING SUPPORT

Load case 1 is initiated along with an accompanying title.

# SUPPORT DISPLACEMENT LOAD 4 FY -0.50

Load 1 is a support displacement load which is also commonly known as a sinking support. FY signifies that the support settlement is in the global Y direction and the value of this settlement is 0.5 inch downward.

## PERFORM ANALYSIS

This command instructs the program to proceed with the analysis.

### PRINT ANALYSIS RESULTS

The above PRINT command instructs the program to print joint displacements, support reactions and member forces.

### FINISH

This command terminates the STAAD run.

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```
STAAD.Pro
                         Version
                         Proprietary Program of
                         Research Engineers, Intl.
                         Date=
                         Time-
                   USER ID:
             ...........
    1. STAAD SPACE TEST FOR SUPPORT DISPLACEMENT
    2. UNITS KIP FEET
    3. JOINT COORDINATES
    4. 1 0.0 0.0 0.0 ; 2 0.0 10.0 0.0
    5. 3 20.0 10.0 0.0 ; 4 20.0 0.0 0.0 6. 5 20. 10. 20. ; 6 20. 0. 20.
    7. MEMBER INCIDENCE
    8. 1 1 2 3
9. 4 3 5 ; 5 5 6
   10. UNIT INCH
   11. MEMB PROP
   12. 1 TO 5 PRIS AX 10. IZ 300. IY 300. IX 10.

    CONSTANT

   14. E 29000. ALL
15. POISSON STEEL ALL
   SUPPORT
   17. 1 4 6 FIXED
   18. LOADING 1 SINKING SUPPORT

    SUPPORT DISPLACEMENT LOAD

   20. 4 FY -0.50
   21. PERFORM ANALYSIS
           PROBLEM STATISTICS
   NUMBER OF JOINTS/MERDED 2/ 2/ 12 DOF
ORIGINAL/FINAL BAND-WIDTH= 2/ 2/ 12 DOF
TOTAL PRIMARY LOAD CASES = 1, TOTAL DEGREES OF FREEDOM =
1 DOUBLE KILO-WORDS

FYMEN = 56
    NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS =
    REQRD/AVAIL. DISK SPACE =
                                 12.0/ 3144.1 MB, EXMEM = 568.2 MB
  22. PRINT ANALYSIS RESULTS
  JOINT DISPLACEMENT (INCH RADIANS)
                                        STRUCTURE TYPE = SPACE
JOINT LOAD
             X-TRANS
                        Y-TRANS Z-TRANS X-ROTAN Y-ROTAN
                                                                    Z-ROTAN
               0.00000
                         0.00000
                                   0.00000
                                              0.00000
                                                          0.00000
                                                                    0.00000
                                              -0.00014
-0.00154
                                                         0.00050
                                                                   -0.00154
-0.00154
              0.09125
                         -0.00040 -0.01078
              0.09118
                         -0.49919 -0.09118
                                                           0.00000
                                                                     0.00000
              0.00000
                         -0.50000
                                    0.00000
                                               0.00000
                                                           0.00000
                                              -0.00154
               0.01078
                         -0.00040
                                    -0.09125
                                                         -0.00050
                                                                    -0.00014
               0.00000
                                   0.00000
```

0.00000

0.00000

0.00000

0.00000

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