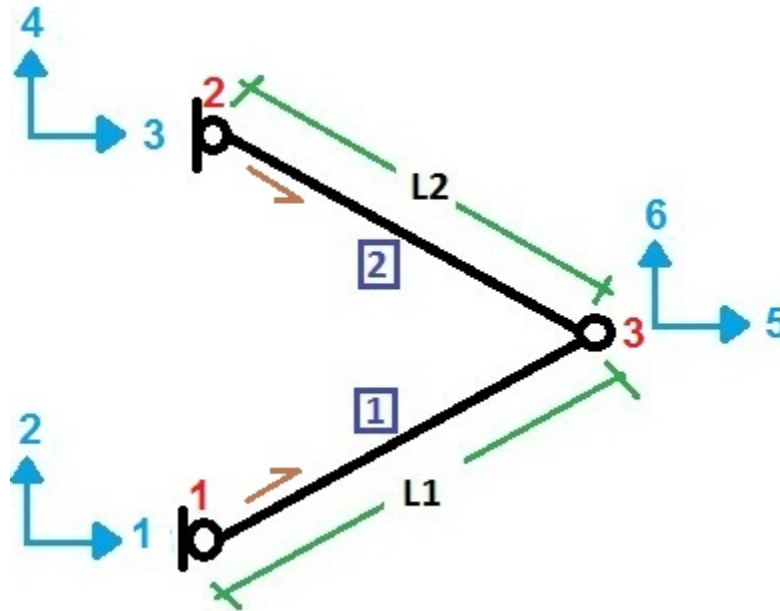


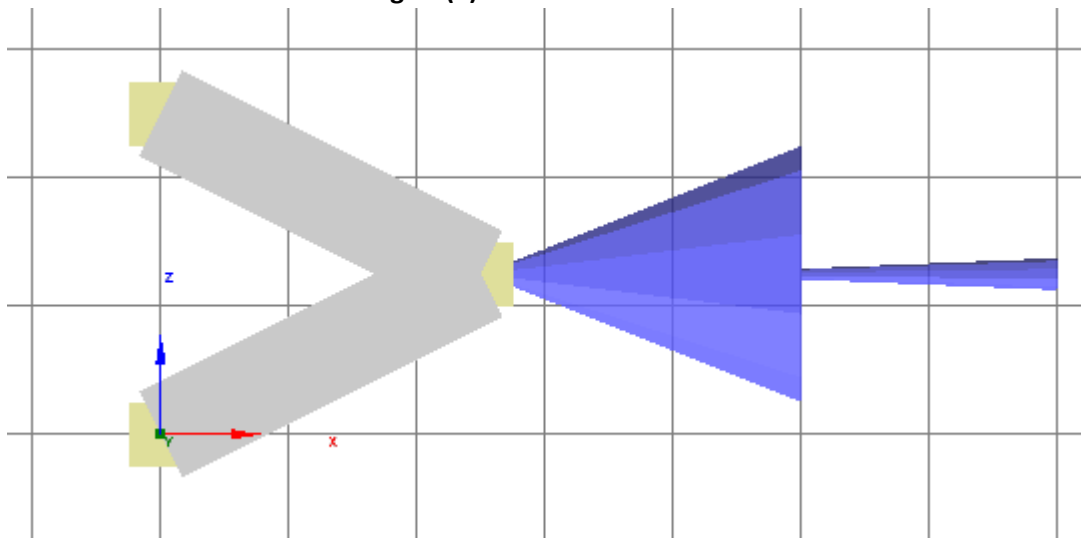
>> IN THE NAME OF GOD <<

## Large axial displacement analysis of two elements truss in MATLAB, SEISMOSTRUCT and ABAQUS (Displacement Control)

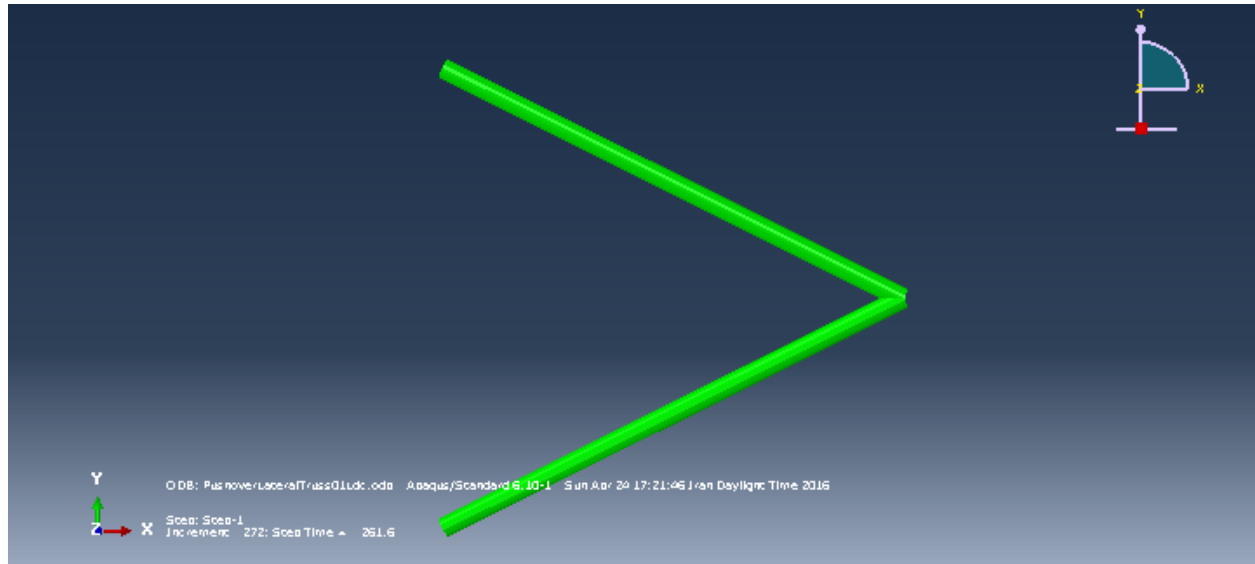
The MATLAB Program is Verified by SEISMOSTRUCT v.7.0.1 and ABAQUS v.6.10.1  
This MATLAB program is written by Salar Delavar Ghashghaei - Date of Publication: April/27/2016  
E-mail: [salar.d.ghashghaei@gmail.com](mailto:salar.d.ghashghaei@gmail.com)



Figure(1) Two elements truss



Figure(2) Two elements truss modelling in Seismostruct version 7.0.1



**Figure(3)** Two elements truss modelling in Abaqus version 6.10.1

#### Define Parameters:

```
% Define Parameters in unit: [mm,kN]
P5=0; % [kN]
P6=0; % [kN]
D5=-1;% [mm] Initial Displacement [DOF (5)] Incremental Displacement
D5max=1000; % [mm] Maximum displacement [DOF (5)]
XY1i=[0 0]; % [x y] Point 1 Coordinate
XY2i=[0 500]; % [x y] Point 2 Coordinate
XY3i=[500 250]; % [x y] Point 3 Coordinate
A1 = 3.1415*(50)^2/4; % [mm^2]
A2 = 3.1415*(50)^2/4; % [mm^2]
E=200;% [N/mm^2] Modulus of elasticity
m = 1000; % number of calculation
itermax = 5000;% maximum number of iterations
tolerance = 1e-12; % specified tolerance for convergence
L1i=(( (XY3i(1)-XY1i(1))^2+(XY3i(2)-XY1i(2))^2)^.5);
L2i=(( (XY3i(1)-XY2i(1))^2+(XY3i(2)-XY2i(2))^2)^.5);
EA1 = E*A1; % [kN]
EA2 = E*A2; % [kN]
```

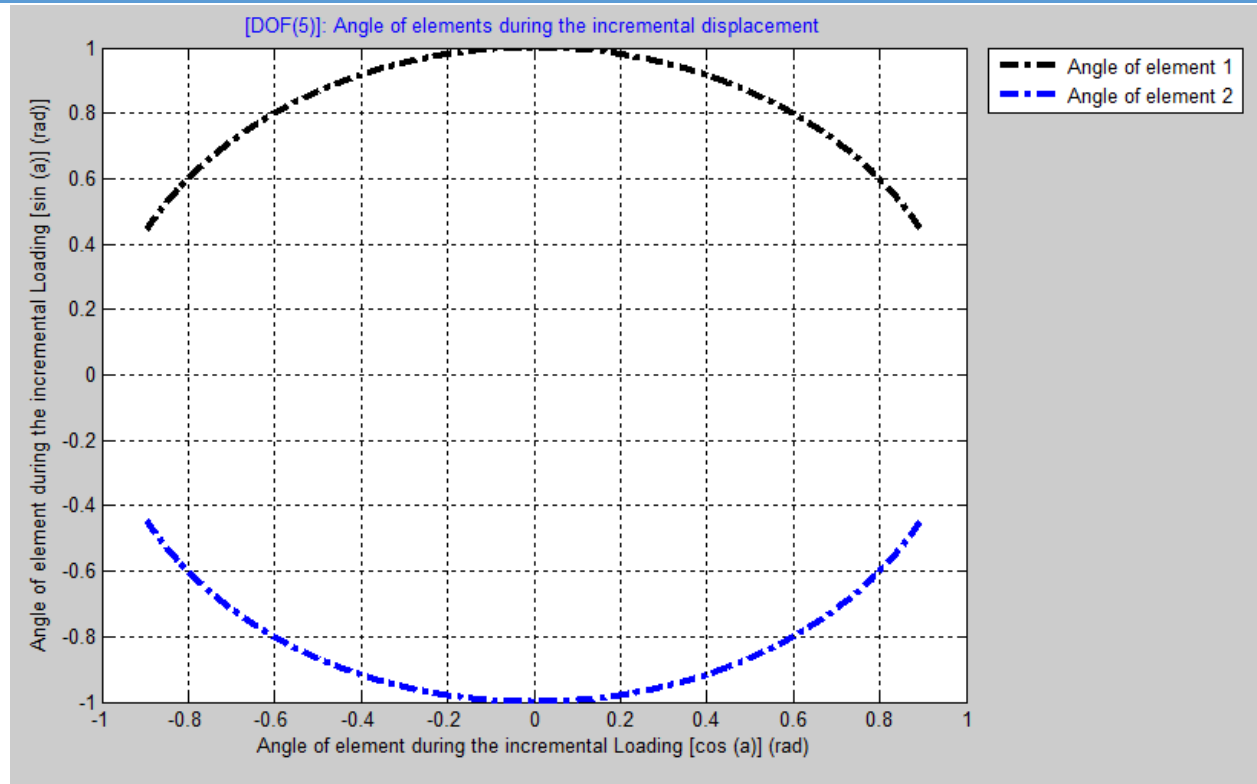
#### Analysis Report:

```
# #####
# Large Displacement Analysis [DOF(5)] #
# #####
(+)Increment 1 : It is converged in 1 iterations
(+)Increment 2 : It is converged in 1 iterations
(+)Increment 3 : It is converged in 1 iterations
(+)Increment 4 : It is converged in 1 iterations
(+)Increment 5 : It is converged in 1 iterations
(+)Increment 6 : It is converged in 1 iterations
(+)Increment 7 : It is converged in 1 iterations
(+)Increment 8 : It is converged in 1 iterations
(+)Increment 9 : It is converged in 1 iterations
(+)Increment 10 : It is converged in 1 iterations
(+)Increment 11 : It is converged in 1 iterations.
.
.
.
(+)Increment 988 : It is converged in 1 iterations
(+)Increment 989 : It is converged in 1 iterations
```

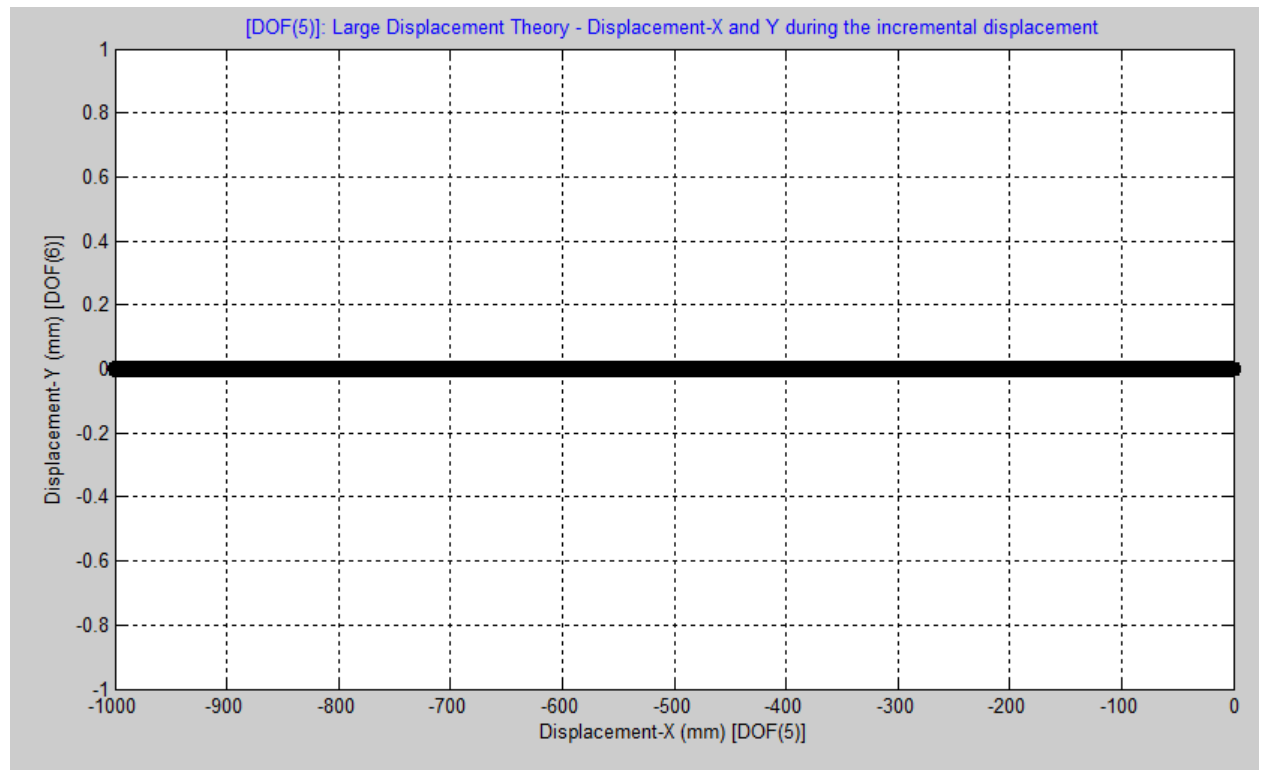
(+)Increment 990 : It is converged in 1 iterations  
 (+)Increment 991 : It is converged in 1 iterations  
 (+)Increment 992 : It is converged in 1 iterations  
 (+)Increment 993 : It is converged in 1 iterations  
 (+)Increment 994 : It is converged in 1 iterations  
 (+)Increment 995 : It is converged in 1 iterations  
 (+)Increment 996 : It is converged in 1 iterations  
 (+)Increment 997 : It is converged in 1 iterations  
 (+)Increment 998 : It is converged in 1 iterations  
 (+)Increment 999 : It is converged in 1 iterations  
 (+)Increment 1000 : It is converged in 1 iterations

## Displacement at [DOF (5)] reached to Ultimate Displacement #

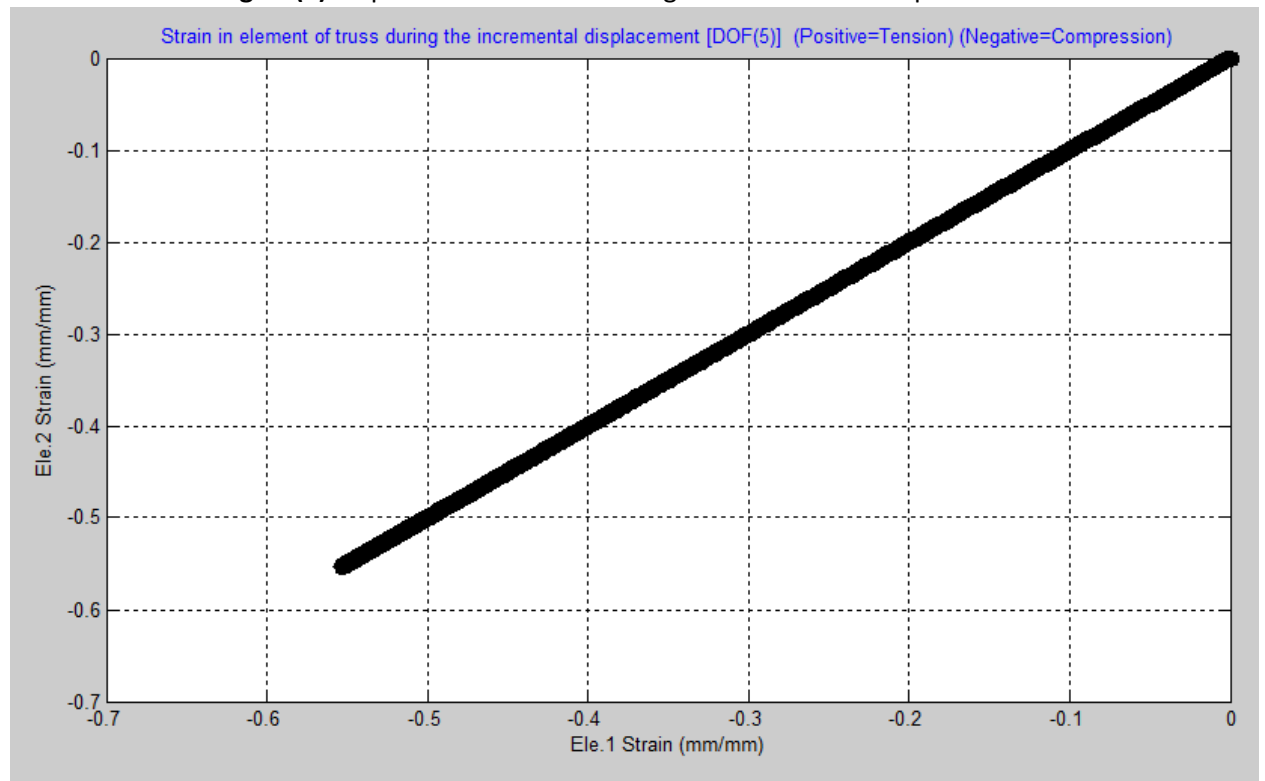
Plot :



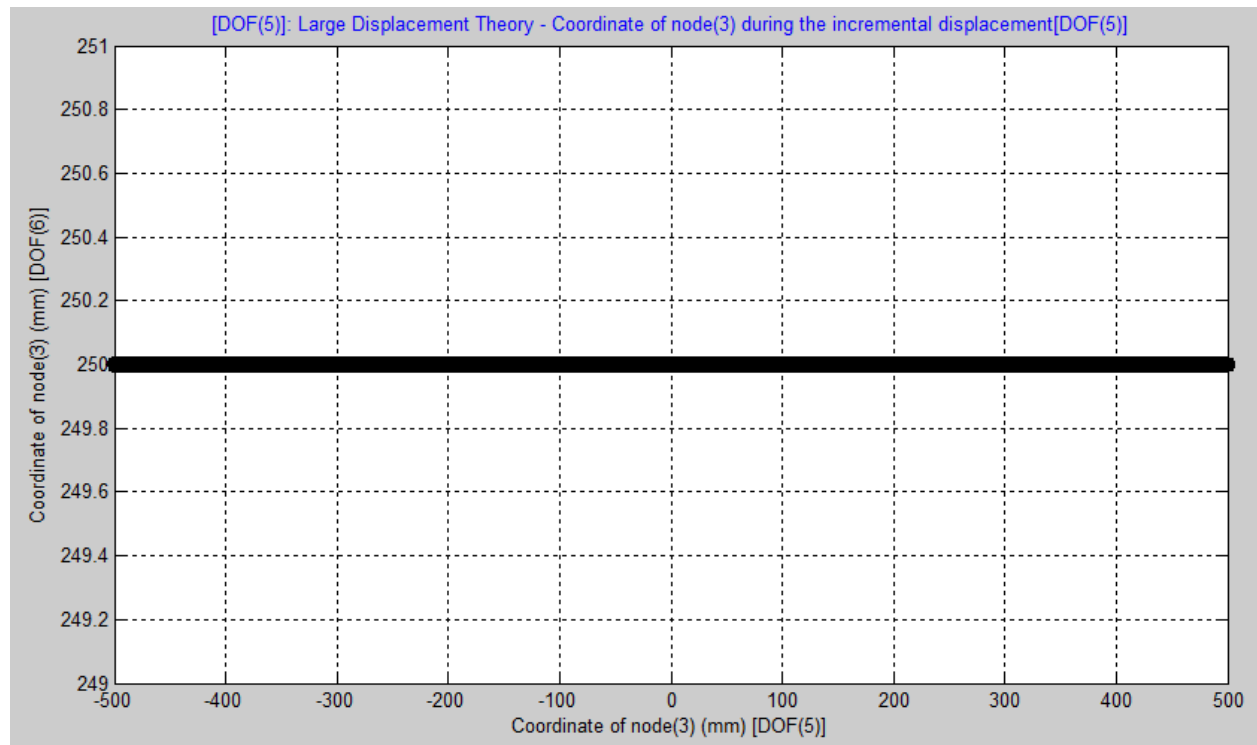
**Figure(4)** Angle of elements during the incremental displacement



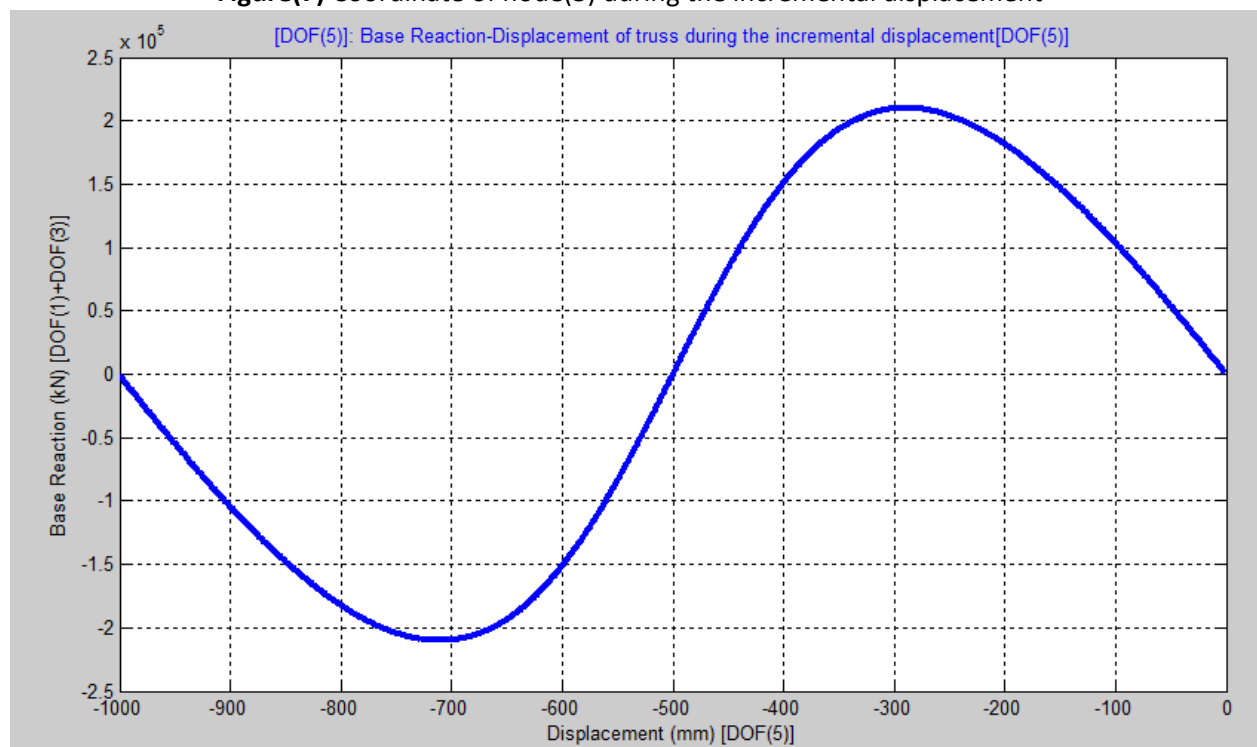
**Figure(5)** Displacement-X and Y during the incremental displacement



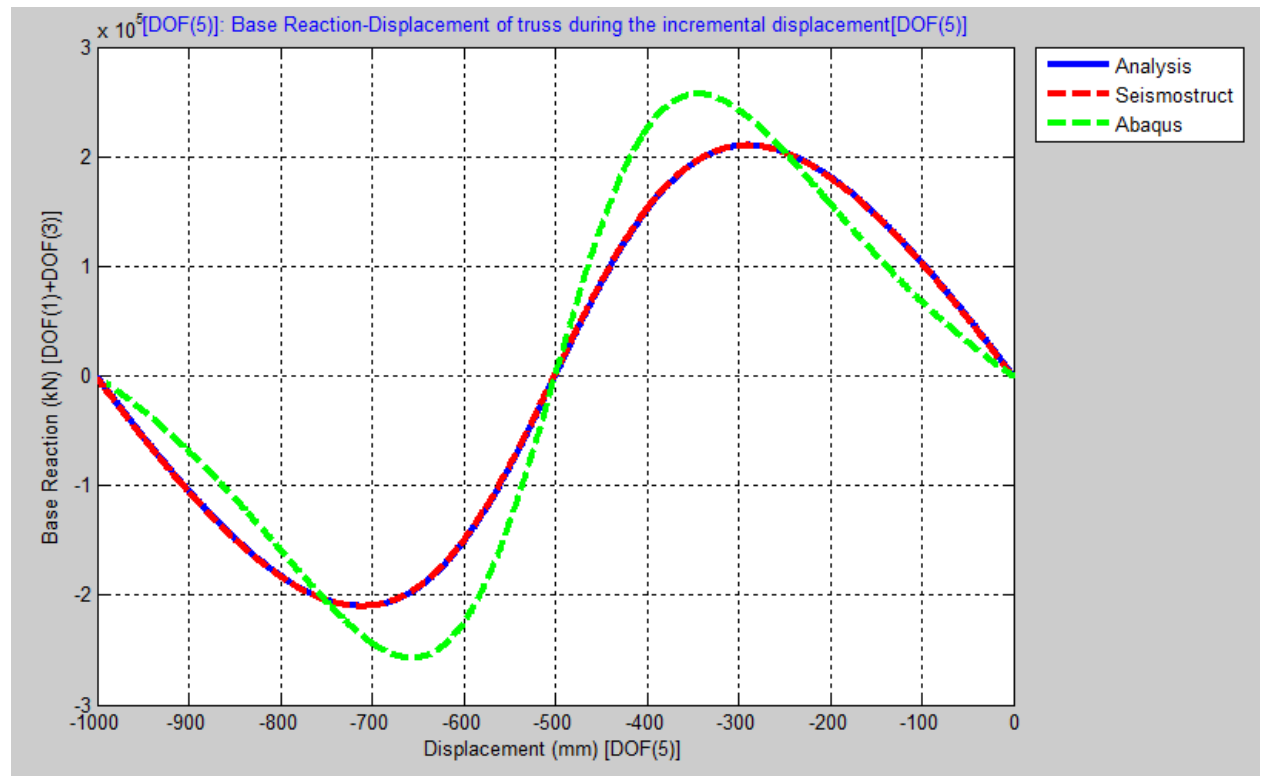
**Figure(6)** Strain in elements of truss during the incremental displacement



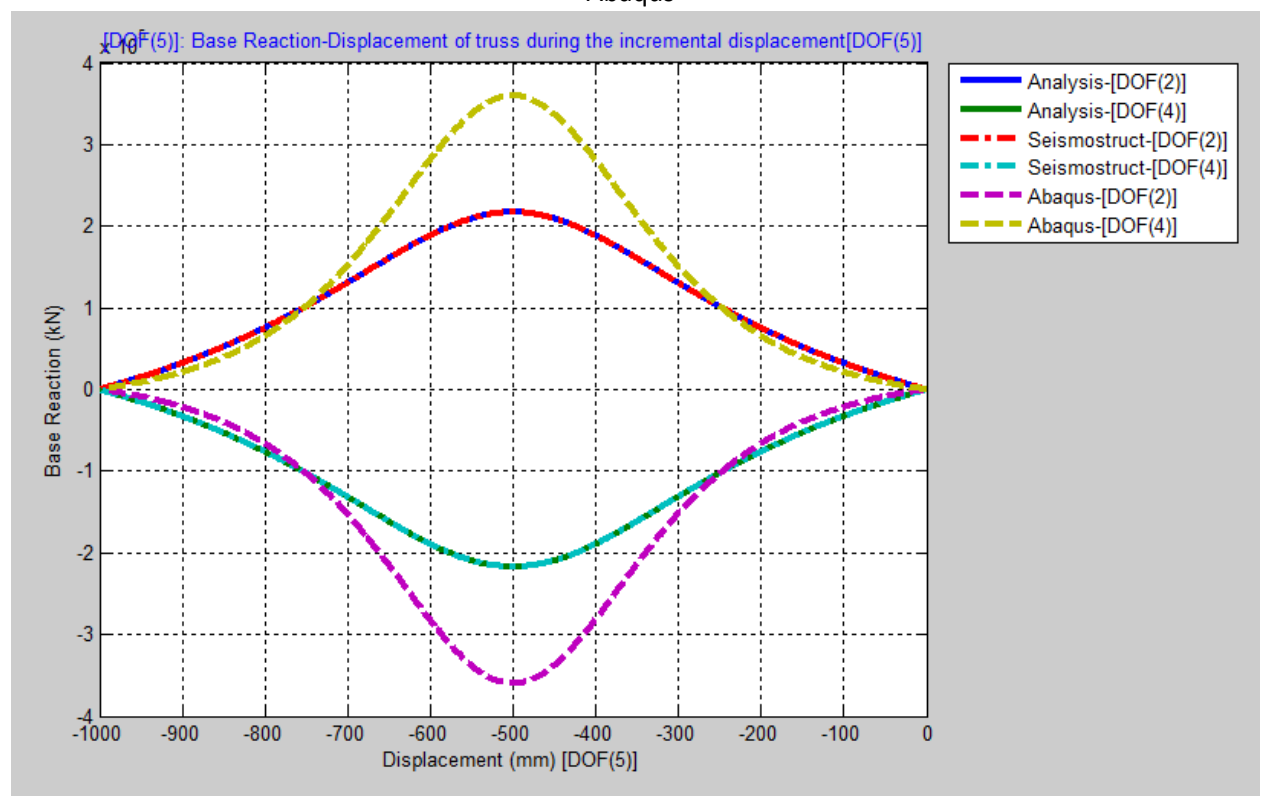
**Figure(7)** Coordinate of node(3) during the incremental displacement



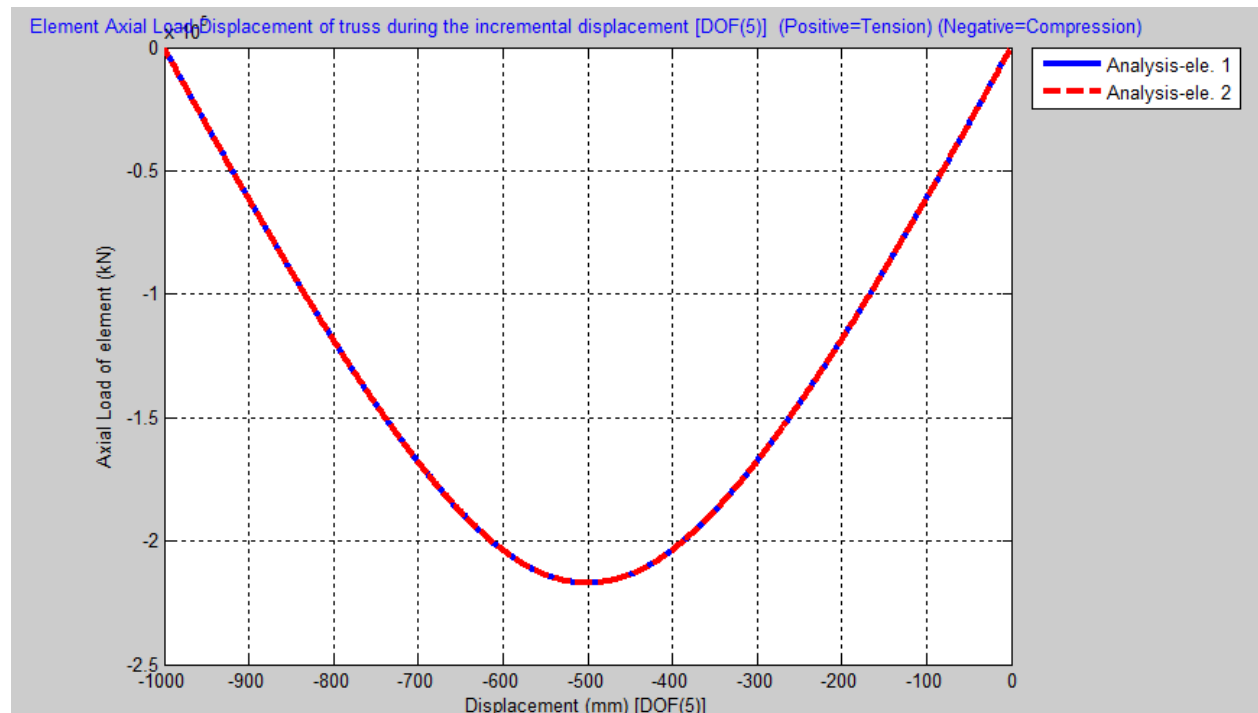
**Figure(8)** Base reaction-Displacement of truss during the incremental displacement



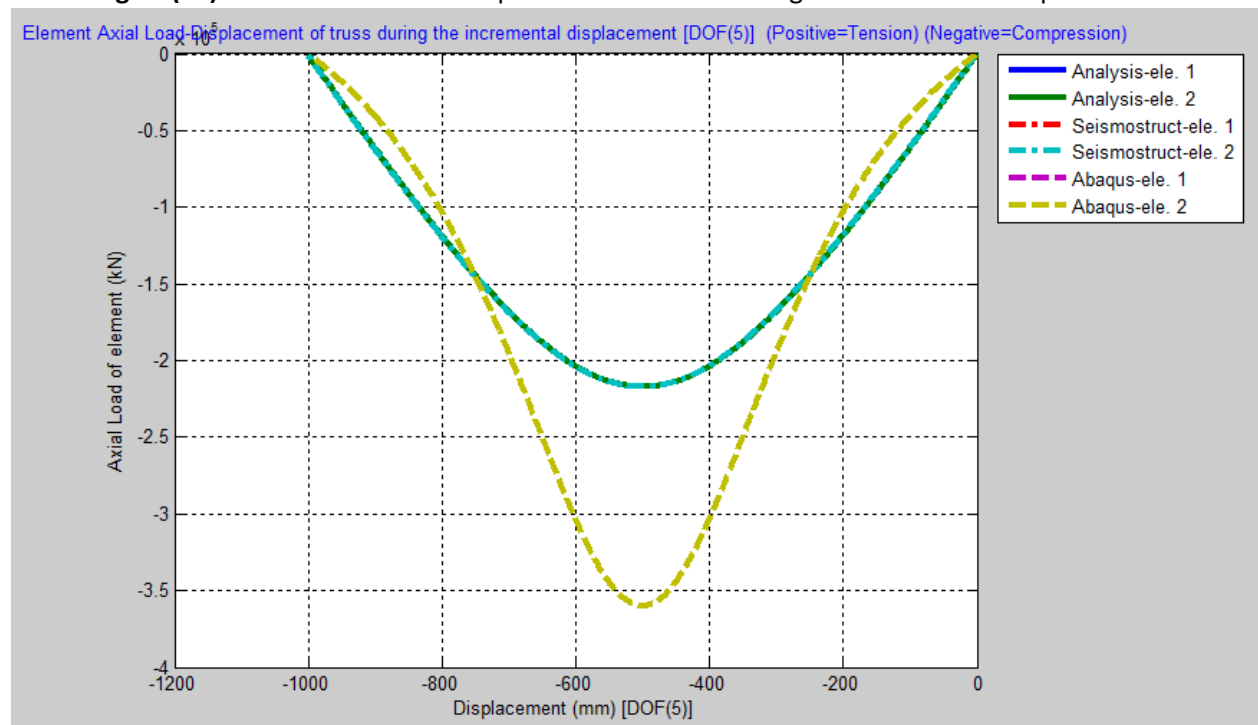
**Figure(9)** Base reaction-Displacement of truss during the incremental displacement in Seismostruct and Abaqus



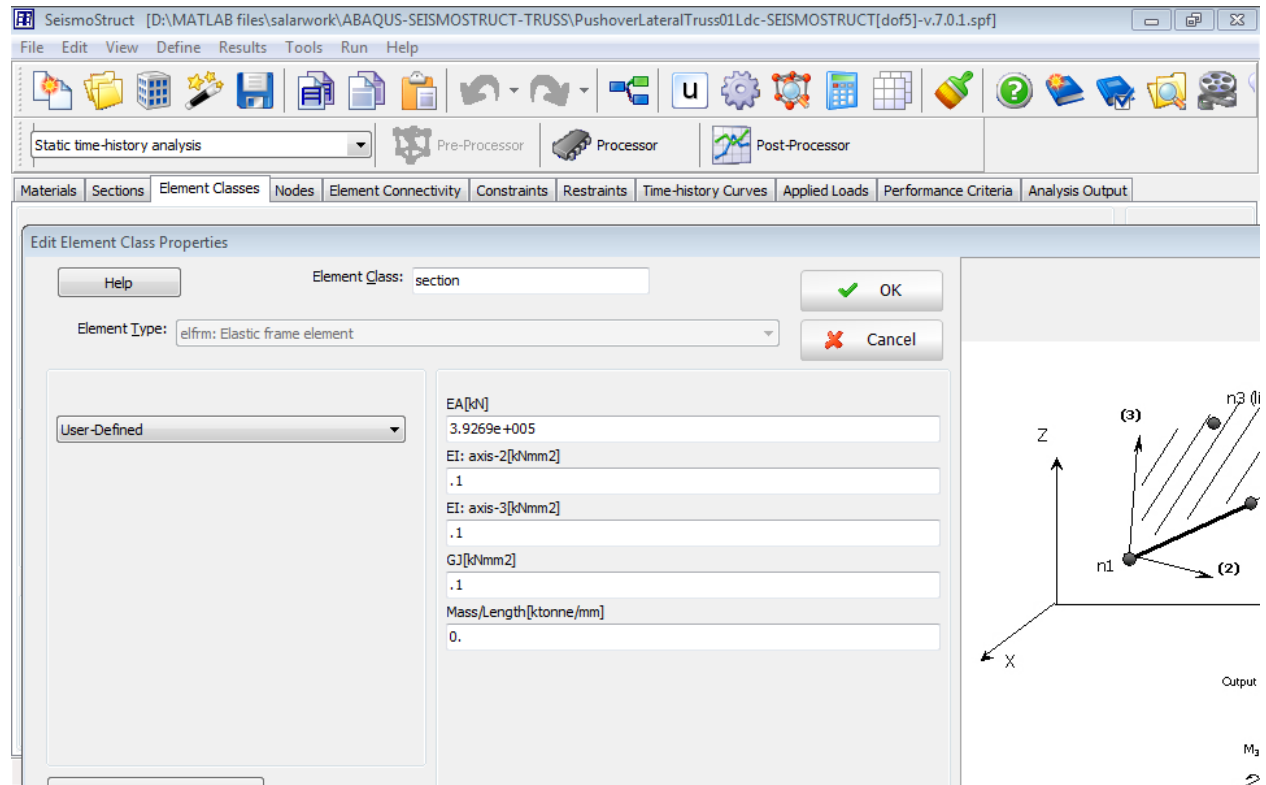
**Figure(10)** Base reaction-Displacement of truss during the incremental displacement in Seismostruct and Abaqus



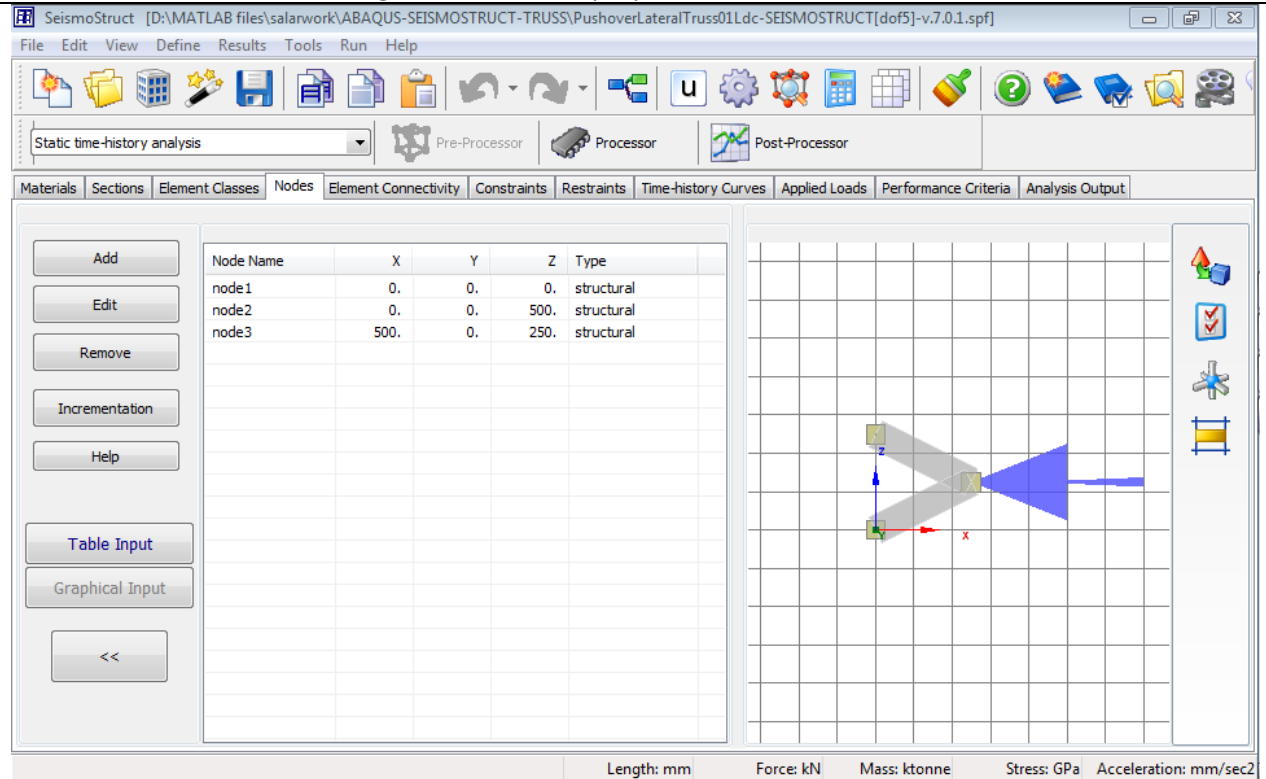
**Figure(11)** Element Axial Load-Displacement of truss during the incremental displacement



**Figure(12)** Element Axial Load-Displacement of truss during the incremental displacement in Seismsotruct and Abaqus

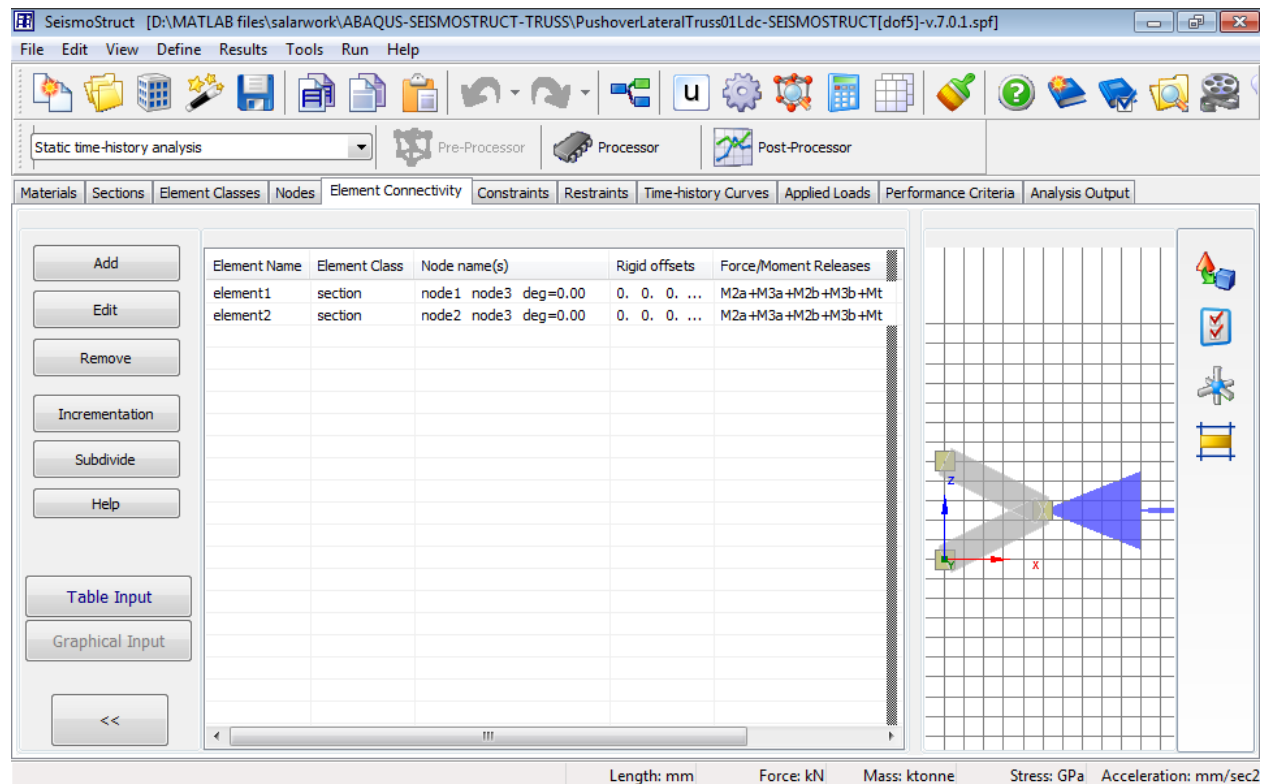


**Figure(13)** Element properties in Seismostruct

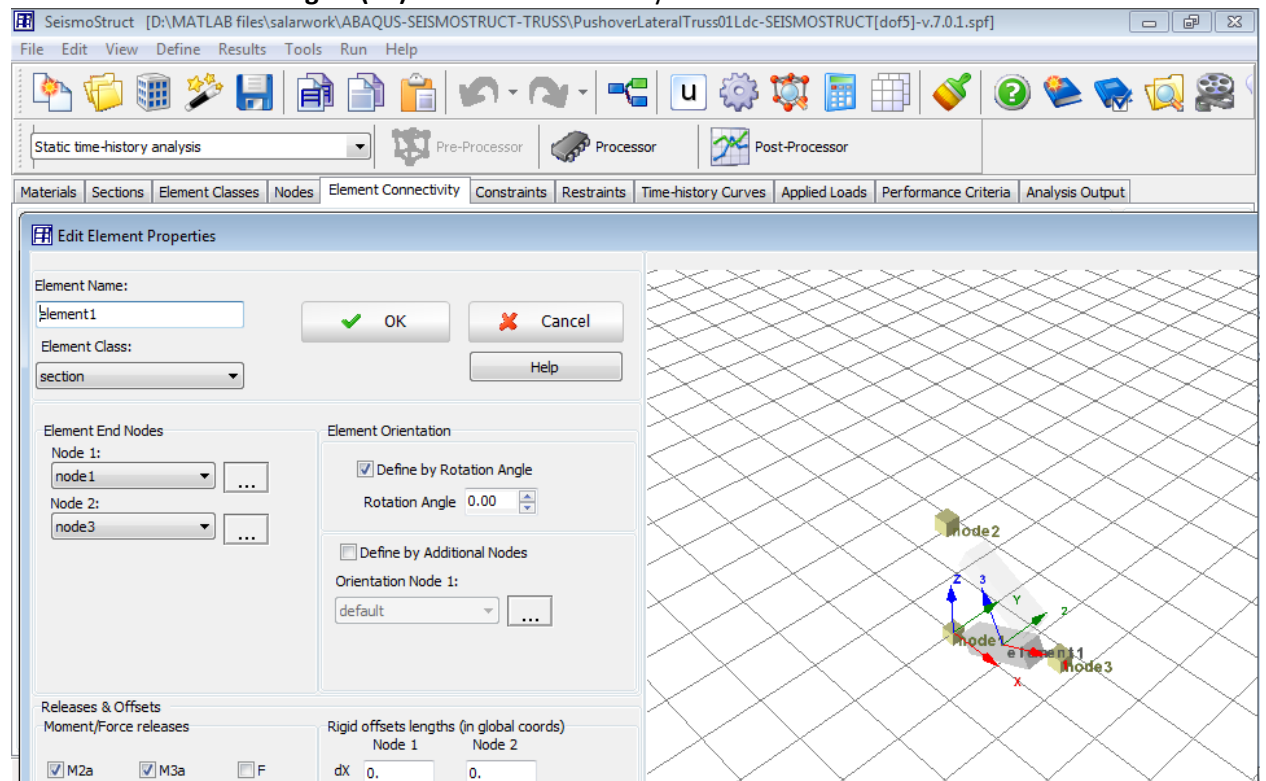


**Figure(14)** Nodes definition in Seismostruct

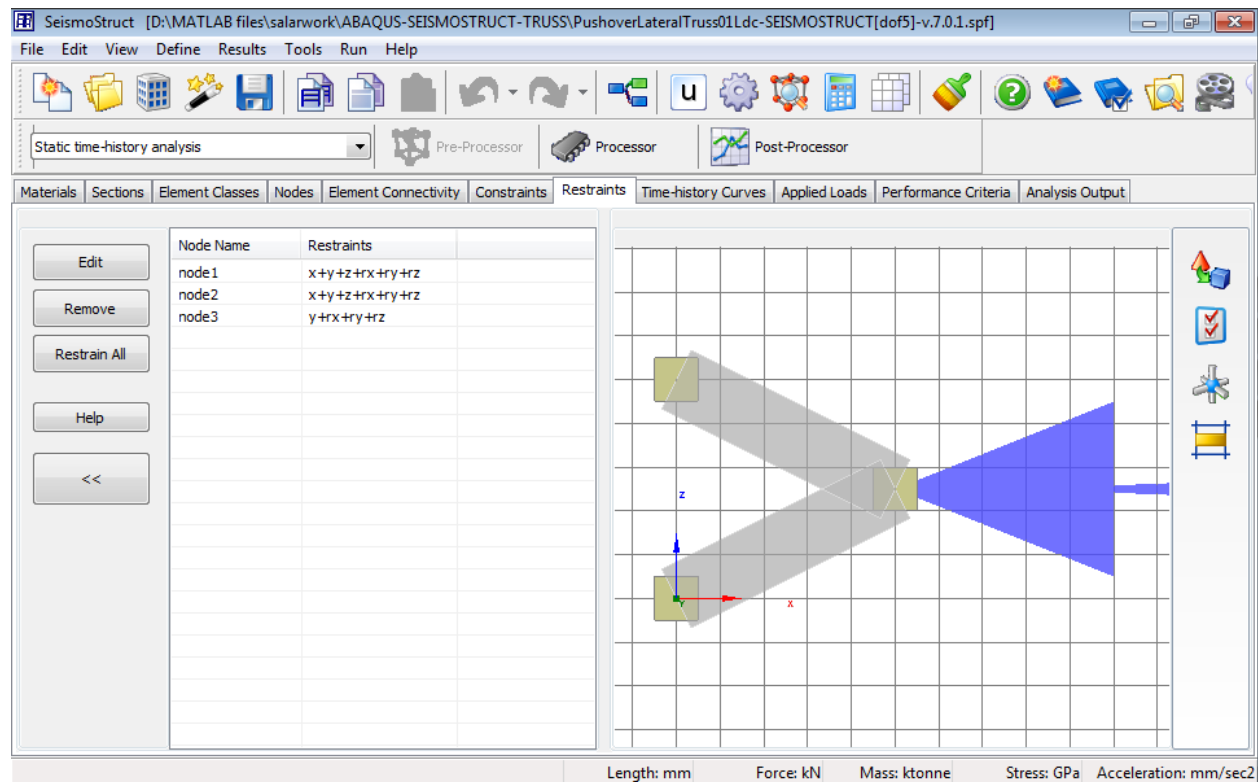




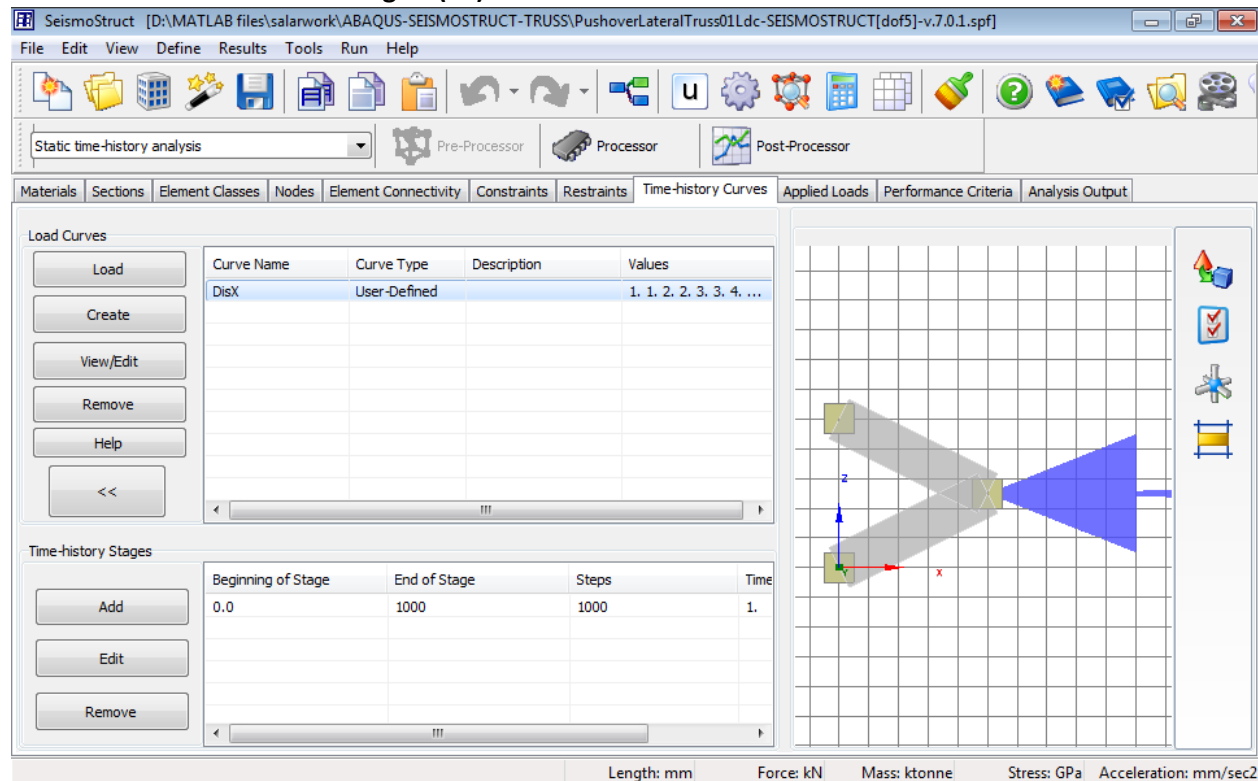
**Figure(15)** Element connectivity definition in Seismostruct



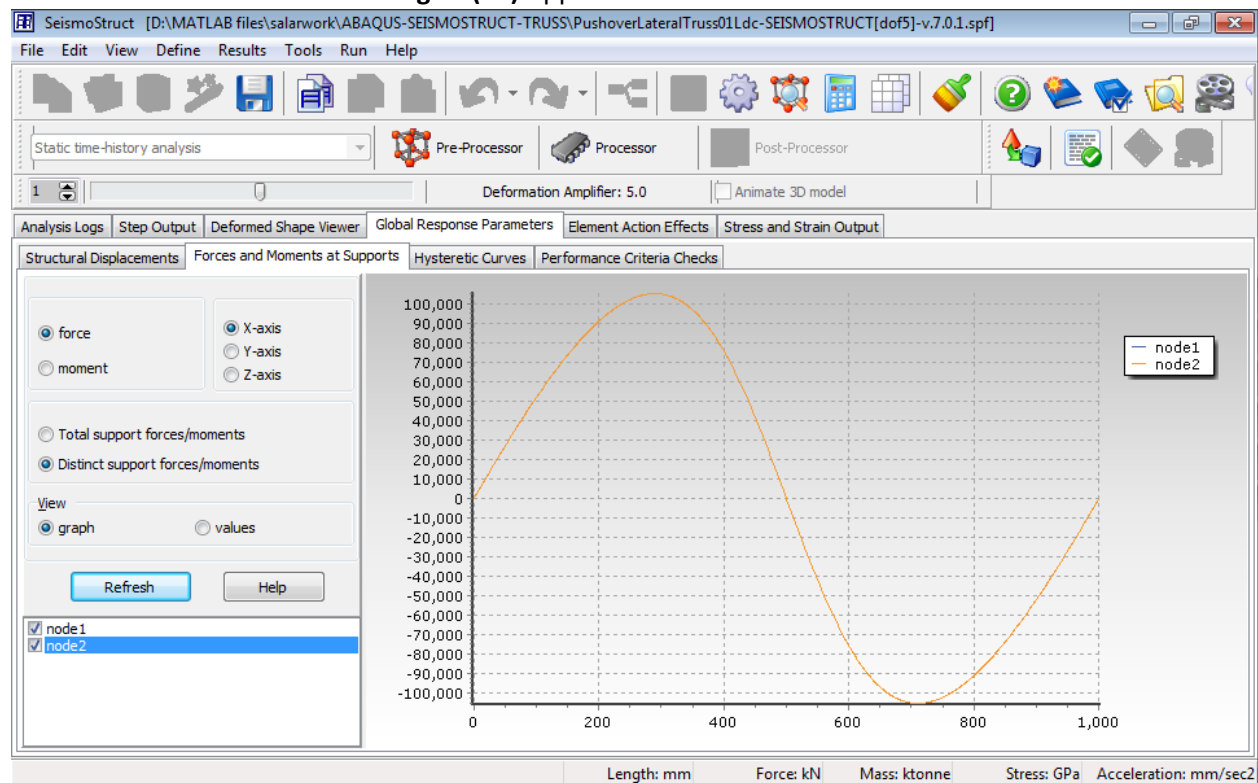
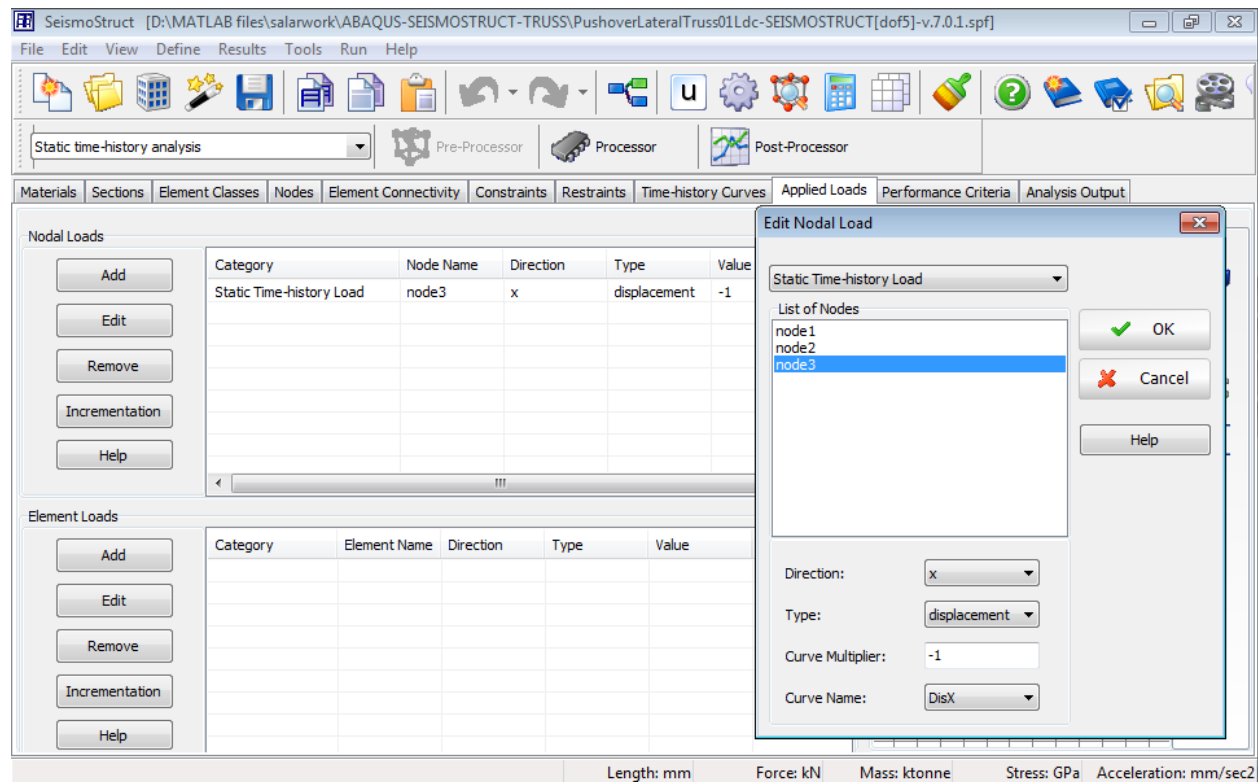
**Figure(16)** Element connectivity definition in Seismostruct

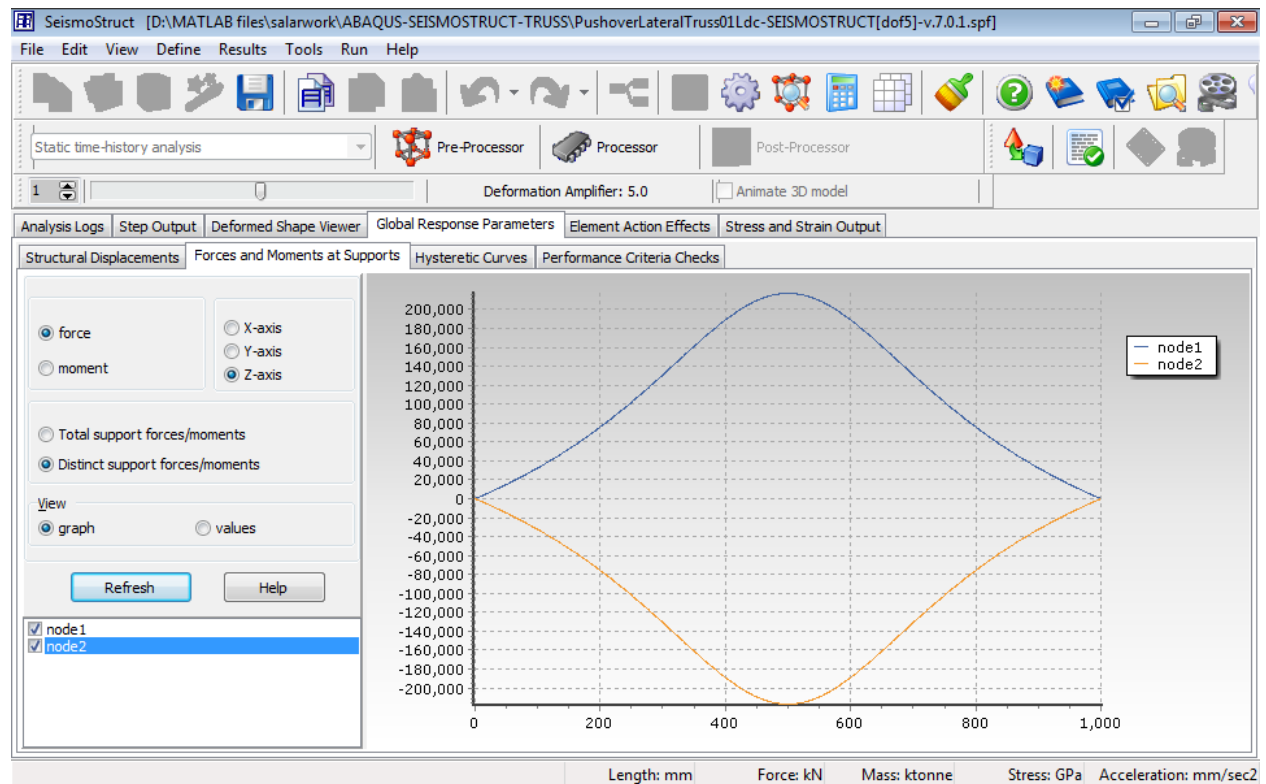


**Figure(17)** Restraint of nodes in Seismostruct

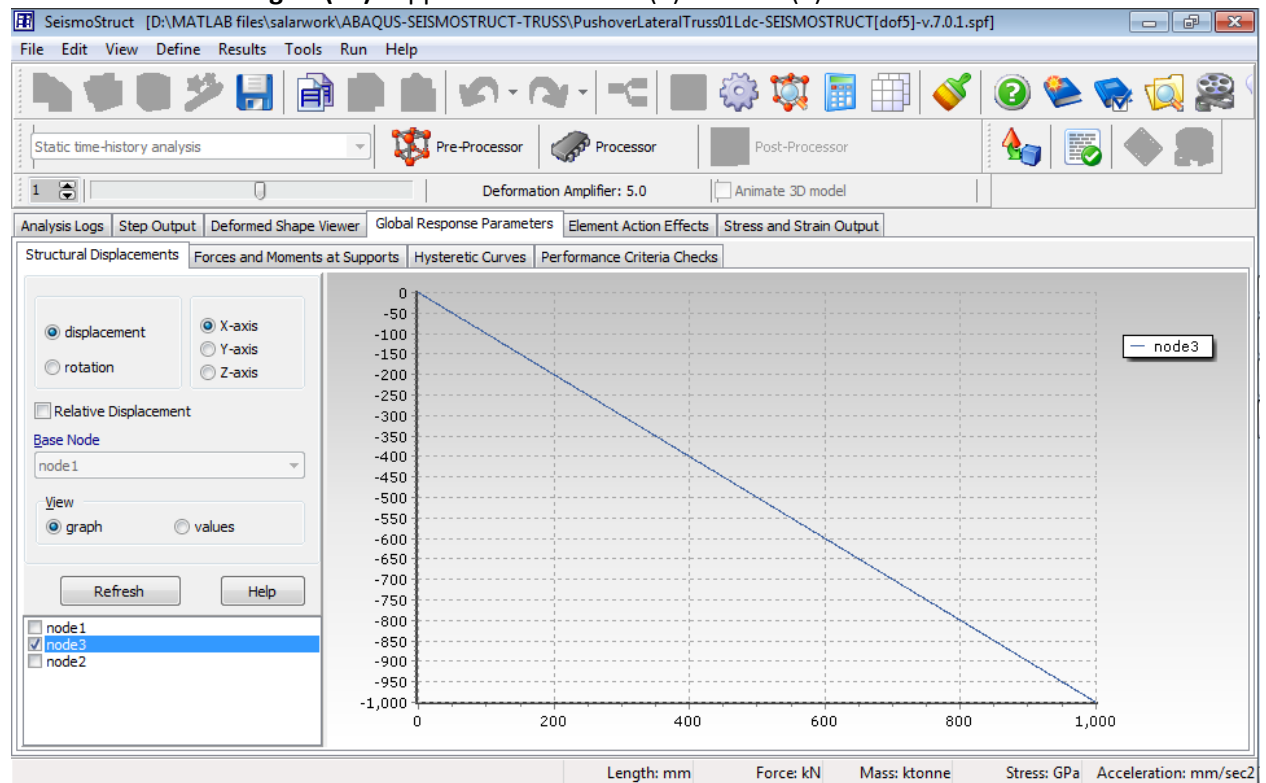


**Figure(18)** Displacement in x-direction time history in Seismostruct

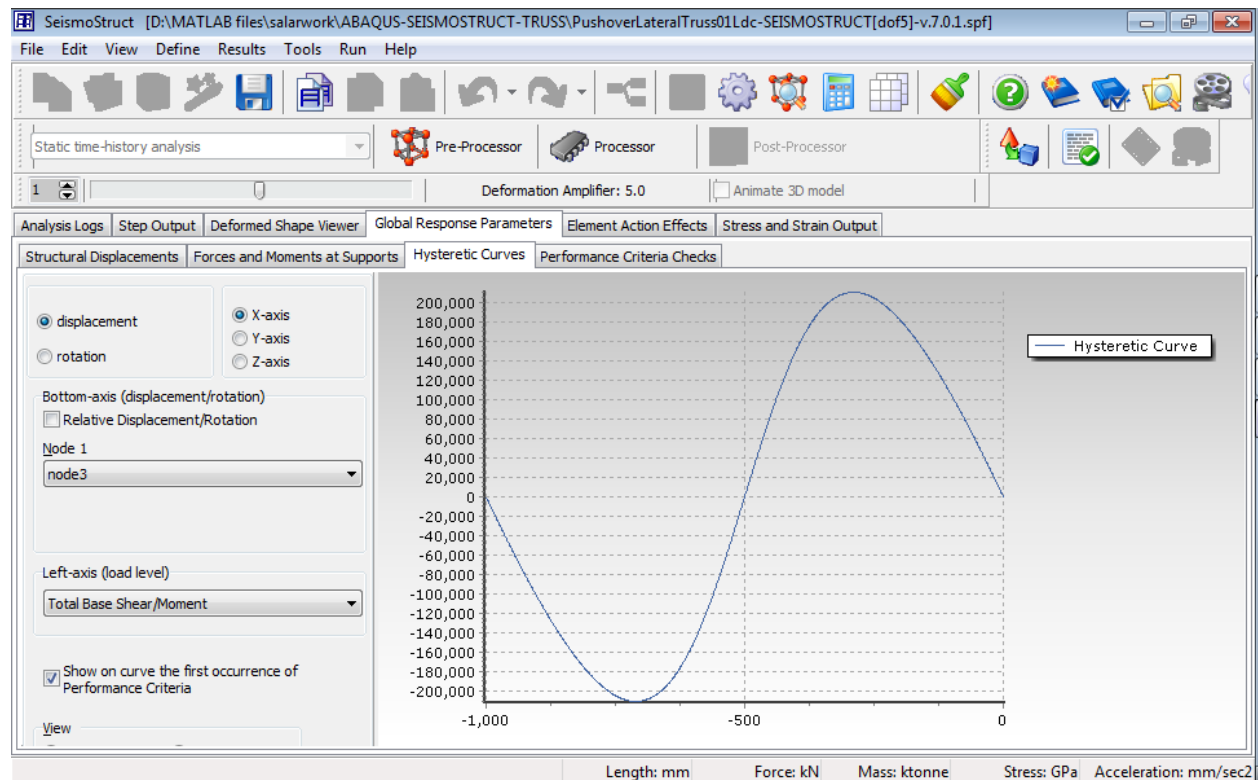




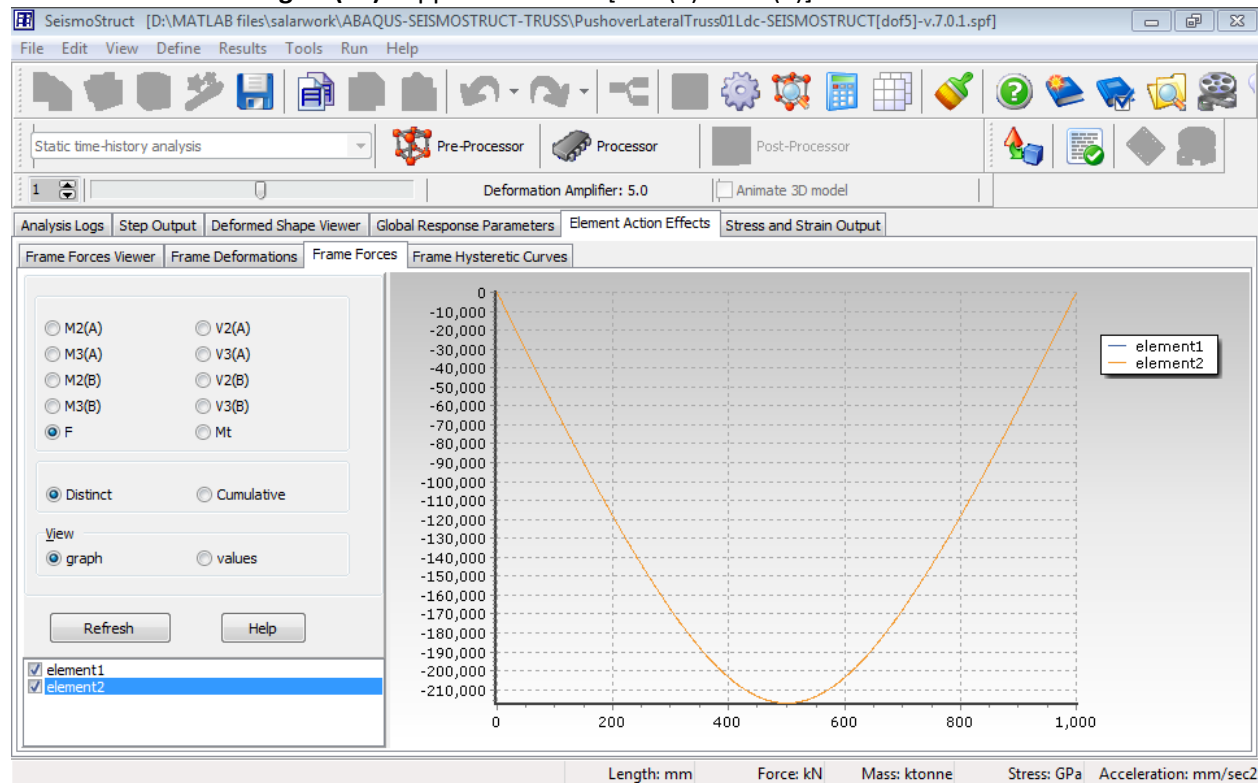
**Figure(21)** Supports reaction DOF(1) and DOF(3) in Seismostruct



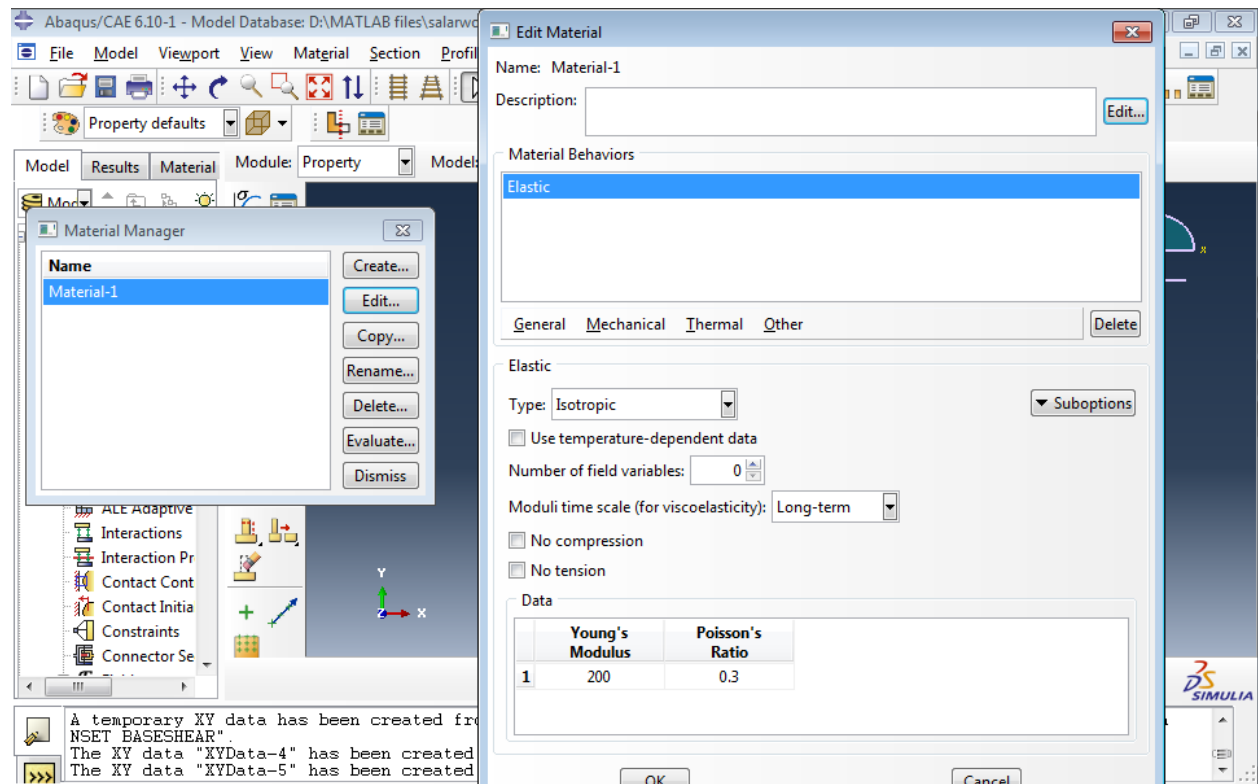
**Figure(22)** Node(3) displacement in Seismostruct



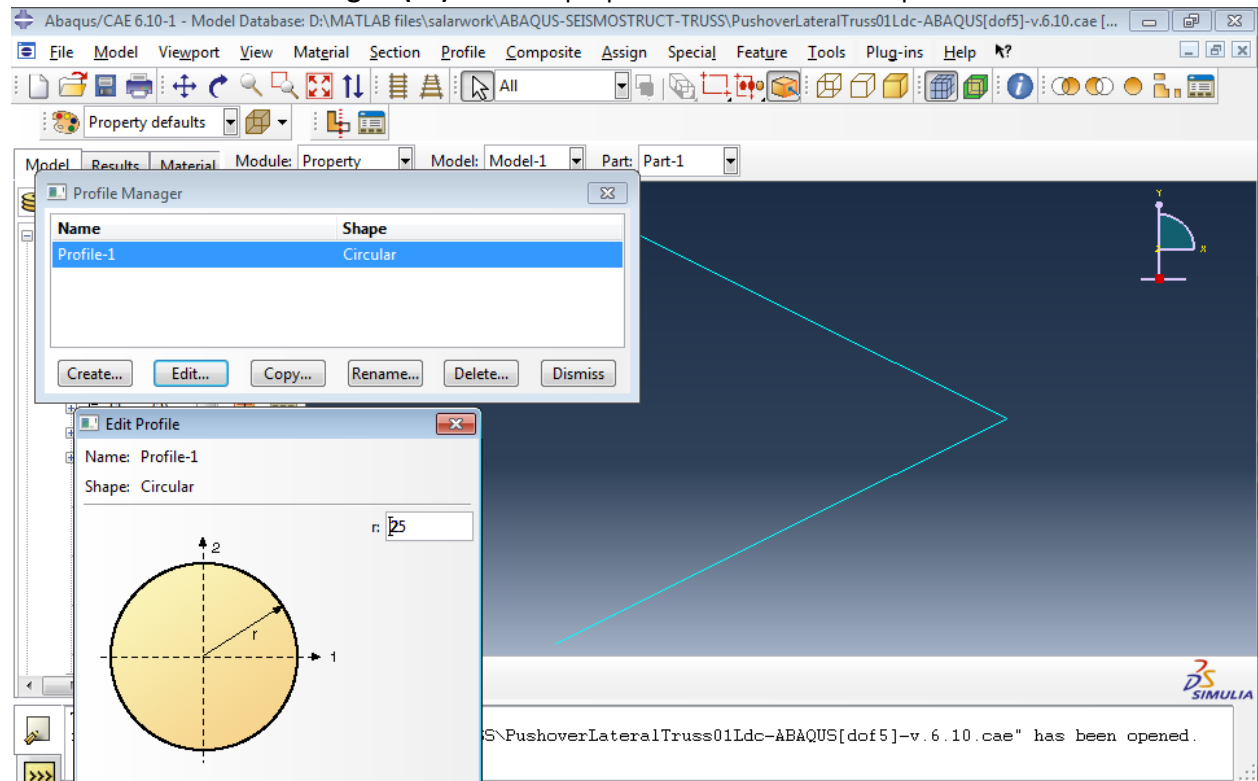
**Figure(23) Supports reaction [DOF(1)+ DOF(3)] in Seismostruct**



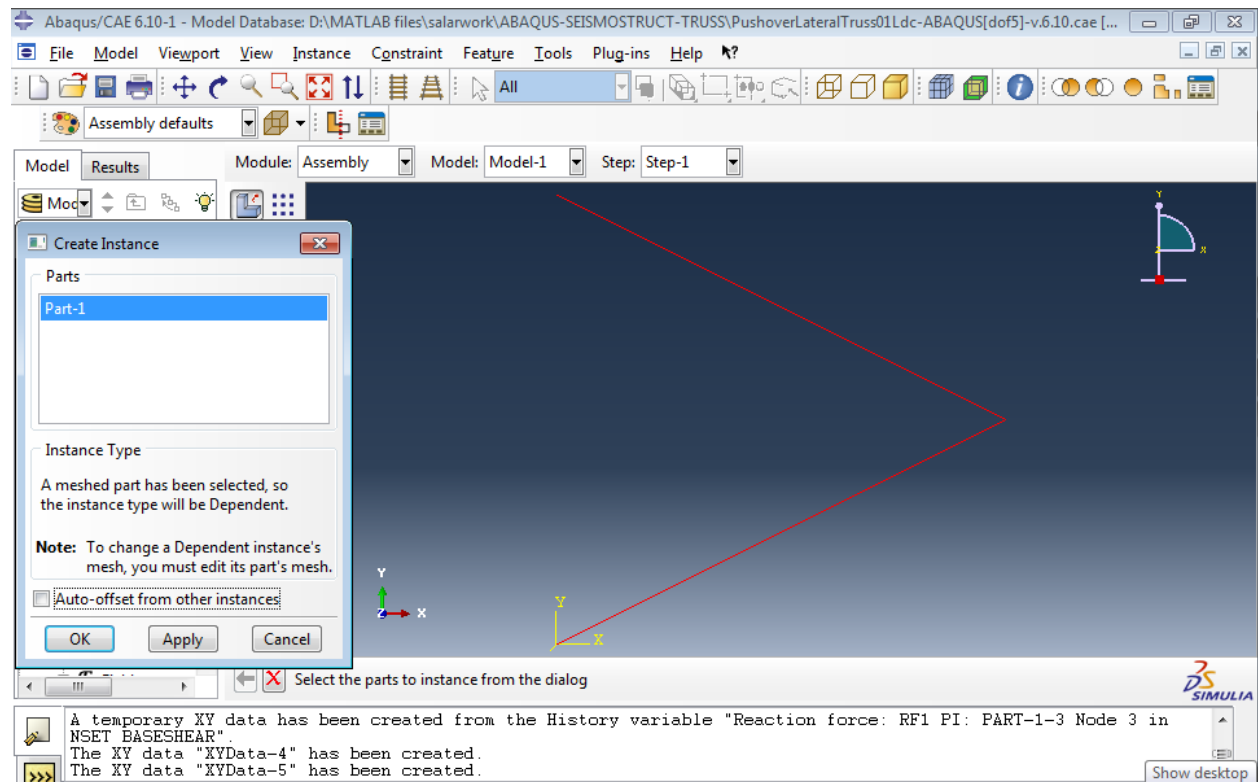
**Figure(24) Axial force of elements in Seismostruct**



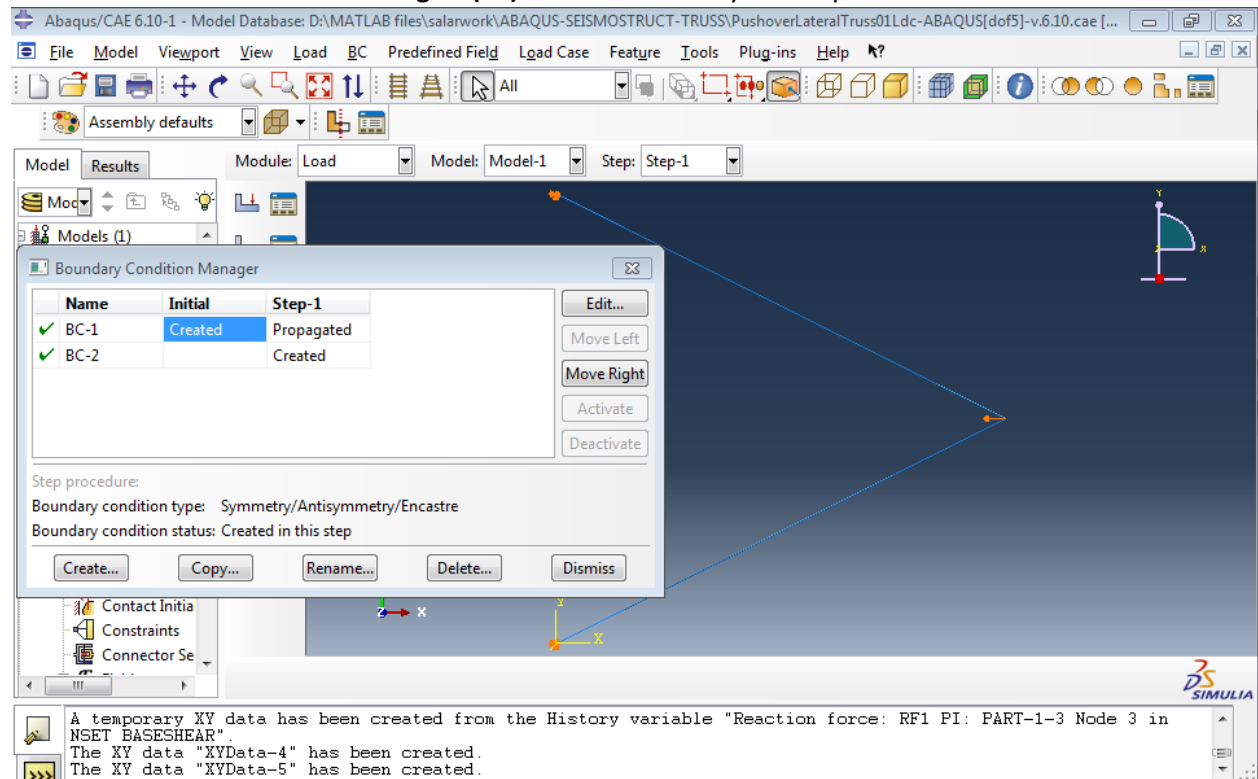
Figure(25) Material properties definition in Abaqus



Figure(26) Section properties definition in Abaqus

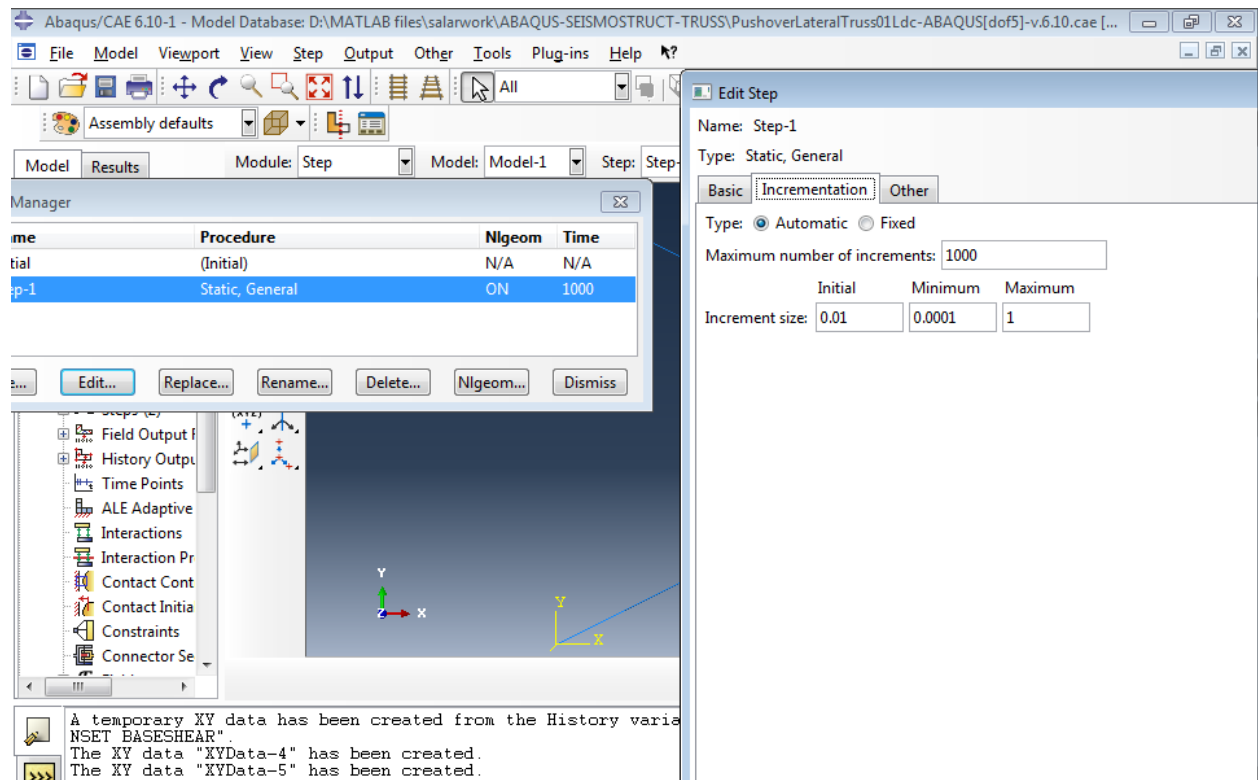


Figure(27) Element assembly in Abaqus

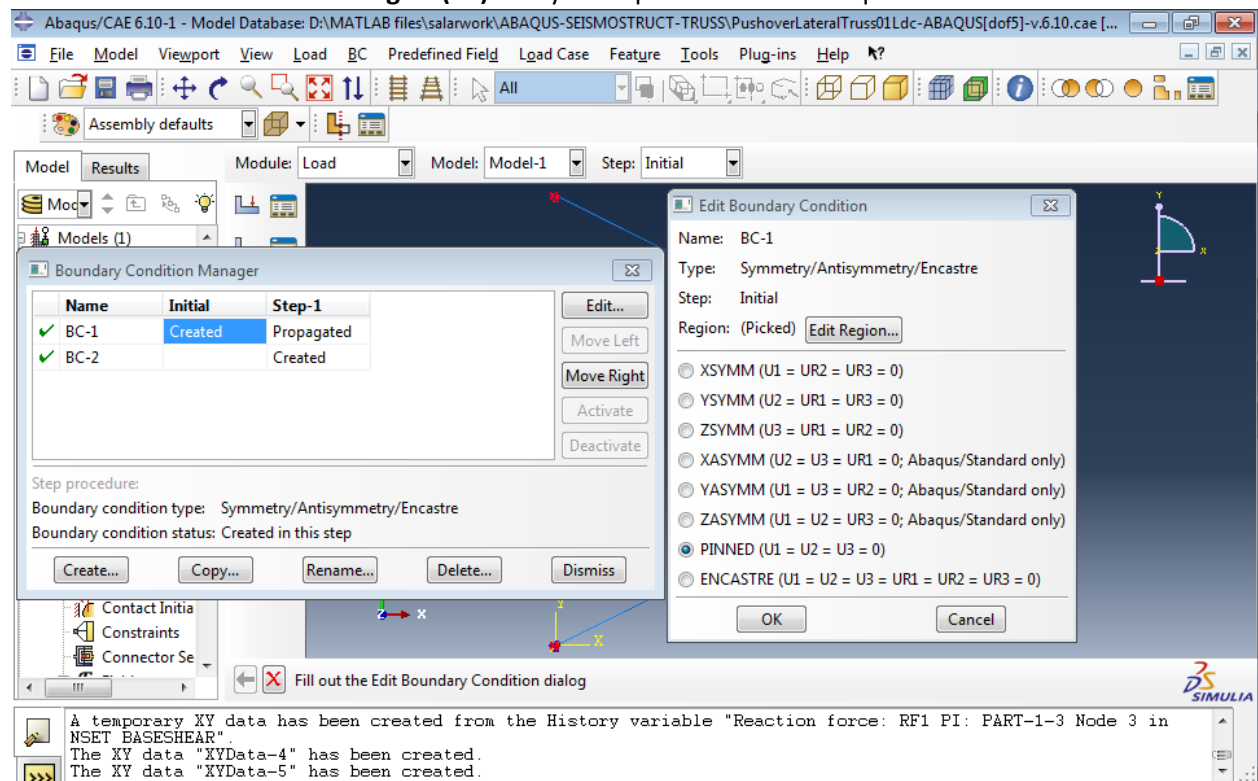


Figure(28) Boundary condition definition in Abaqus





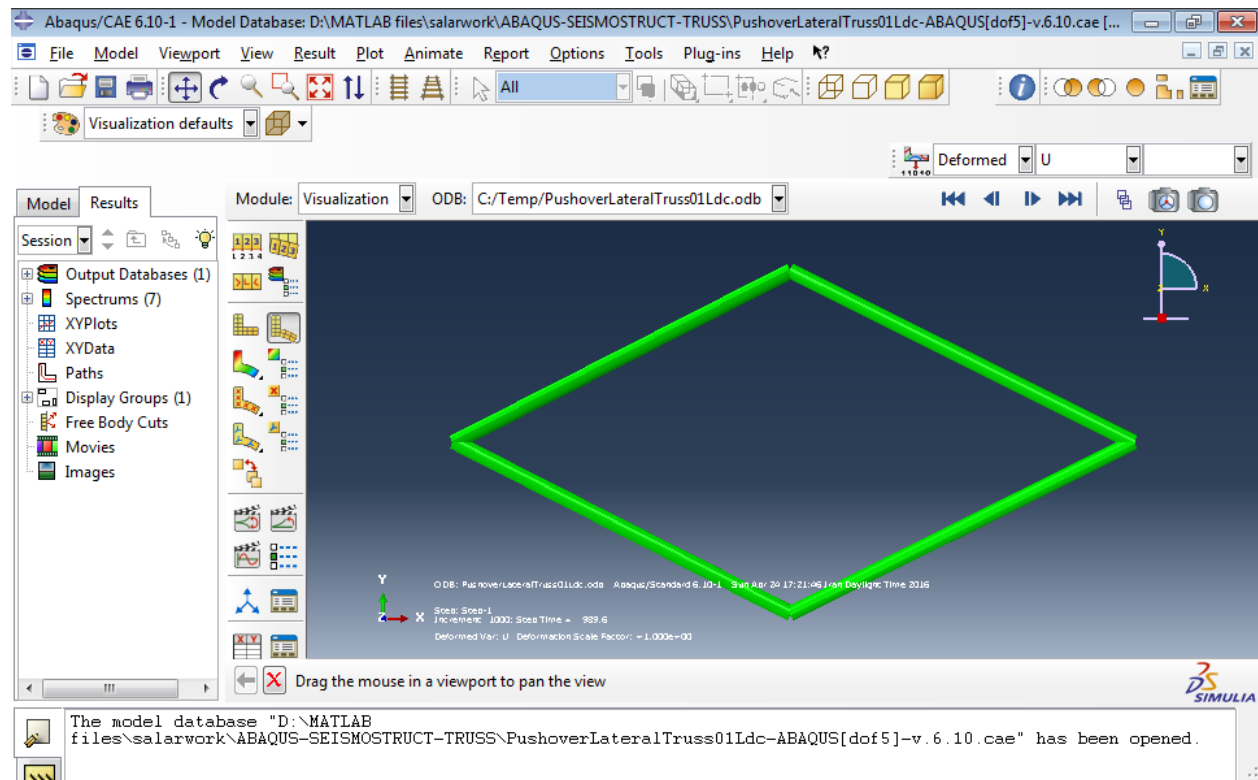
**Figure(29) Analysis step definition in Abaqus**



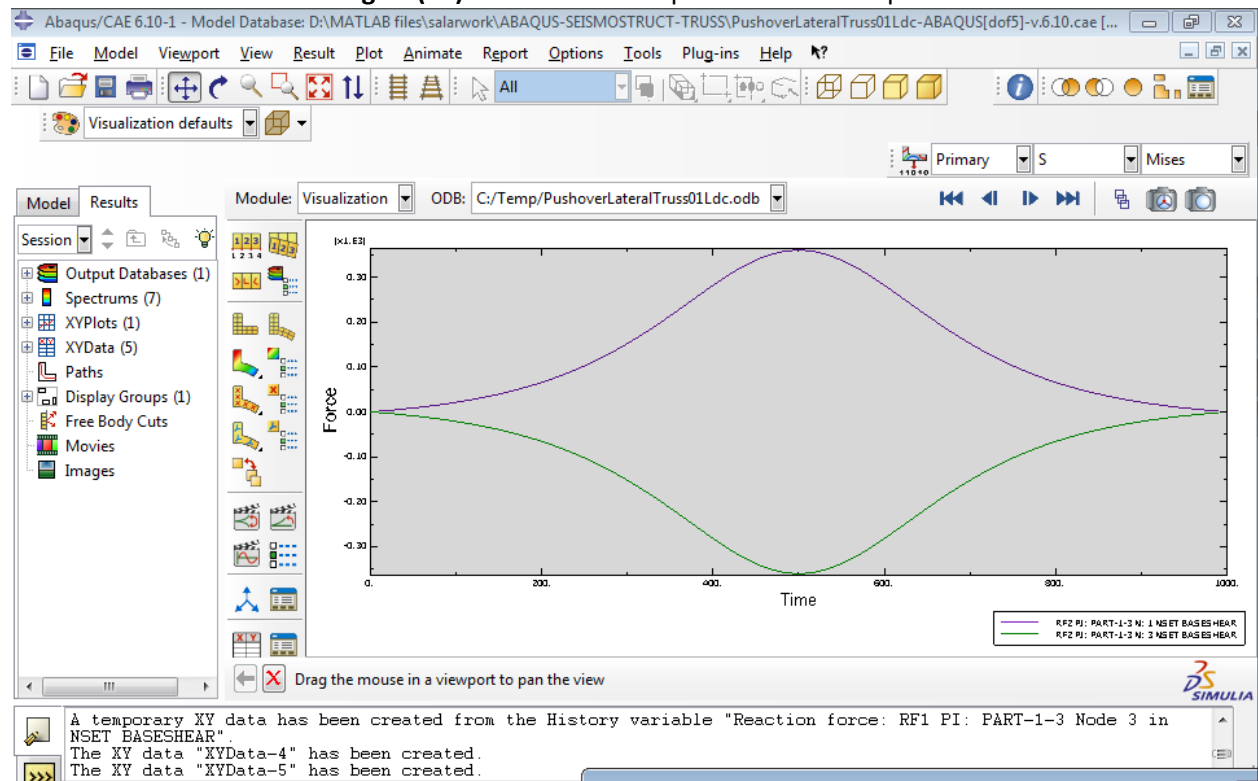
**Figure(30) Boundary condition in Abaqus**



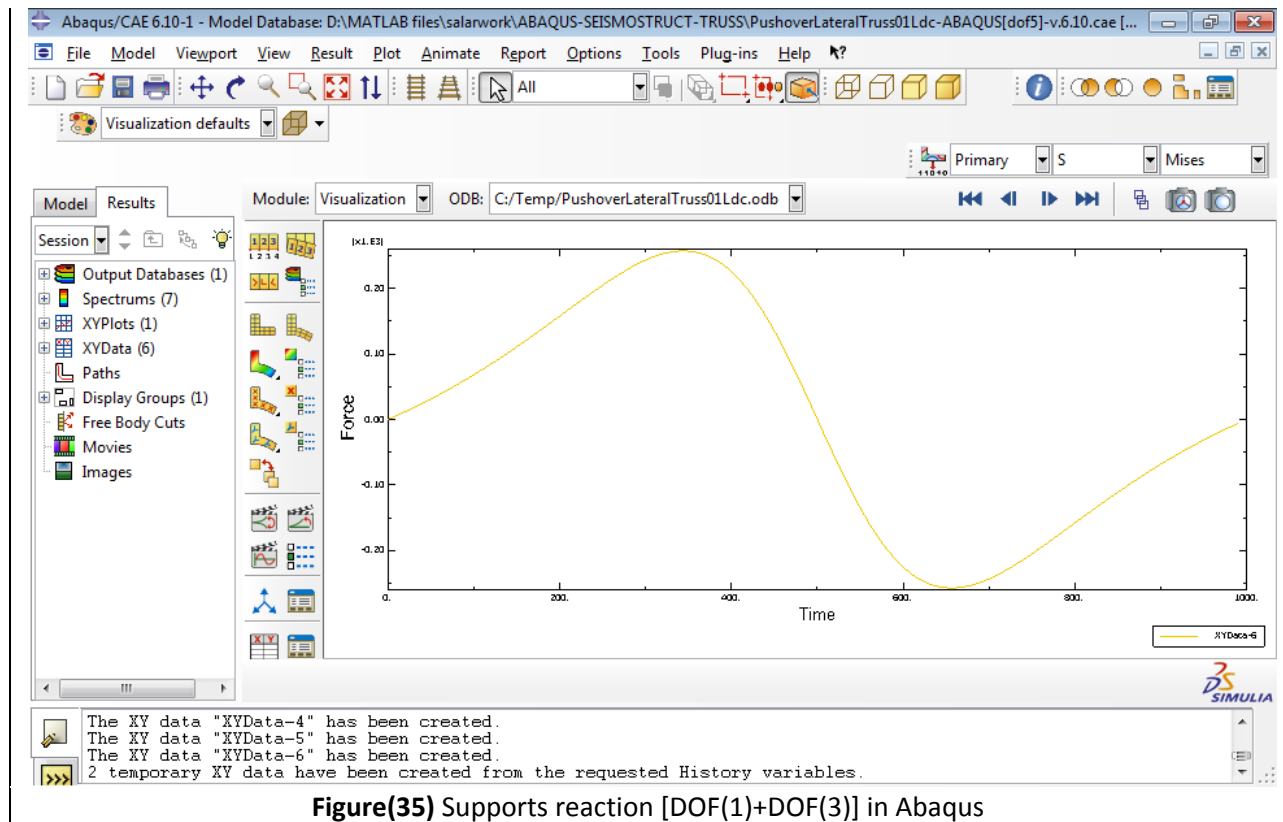




**Figure(33)** First and last shape of truss in Abaqus



**Figure(34)** Supports reaction DOF(1) and DOF(3) in Abaqus



**Figure(35)** Supports reaction [DOF(1)+DOF(3)] in Abaqus