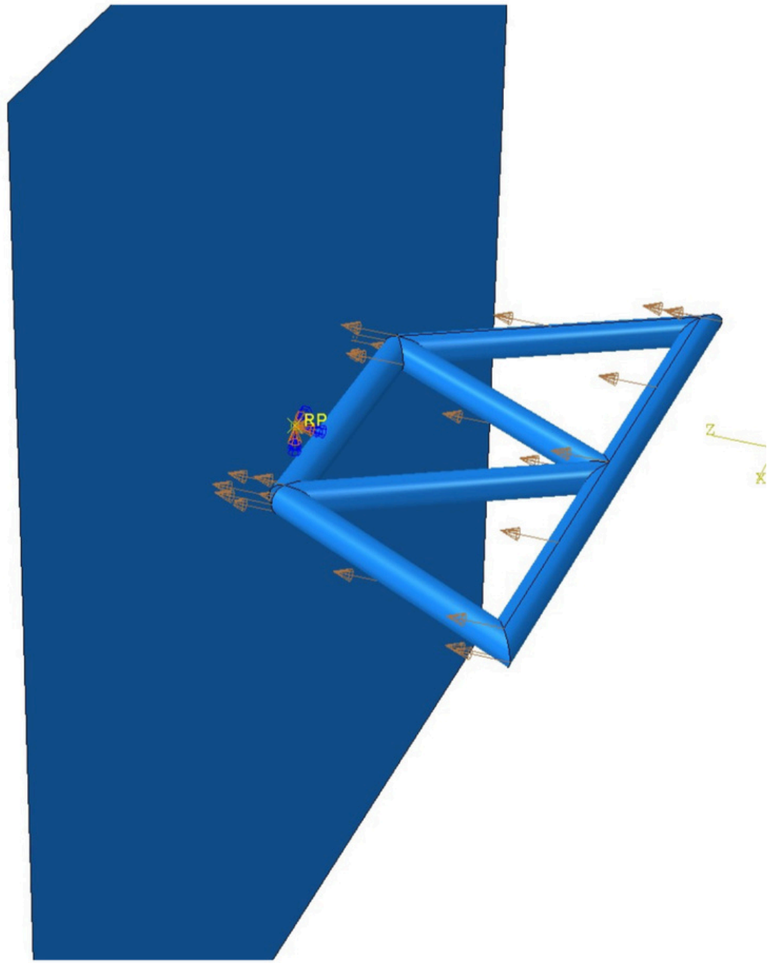
Impact Analysis

Case 1 (Impact perpendicular to the wall):



Properties:

Length of each cylindrical rod = 50m

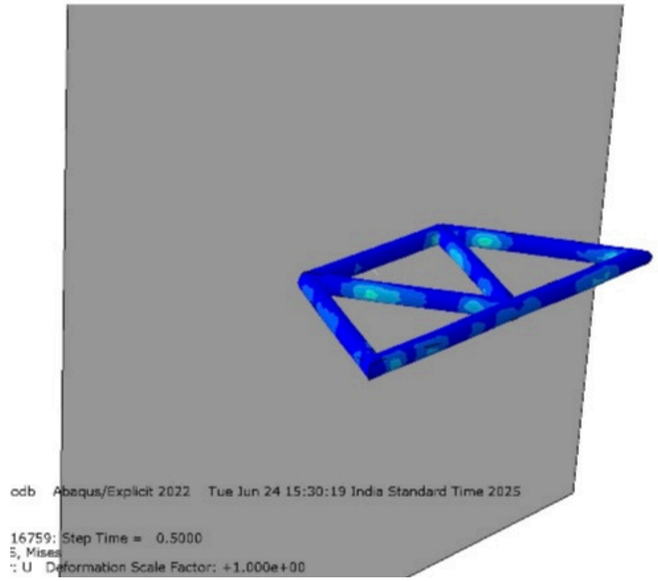
Radius of each cylindrical rod = 5m

Young's modlus of material = 200GPa

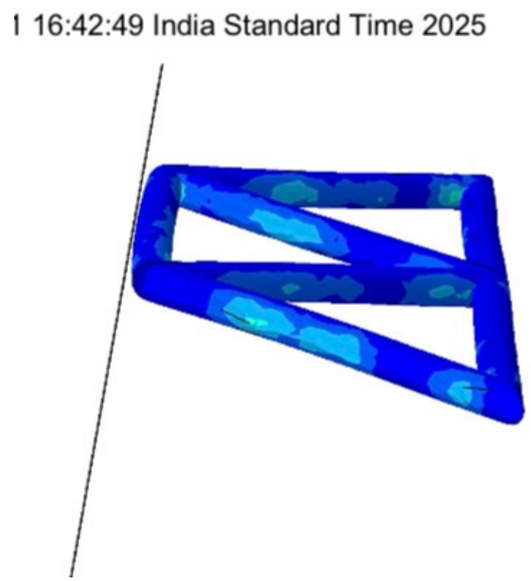
Poisson's ratio = 0.3

Coefficient of friction between wall and beam = 0.2

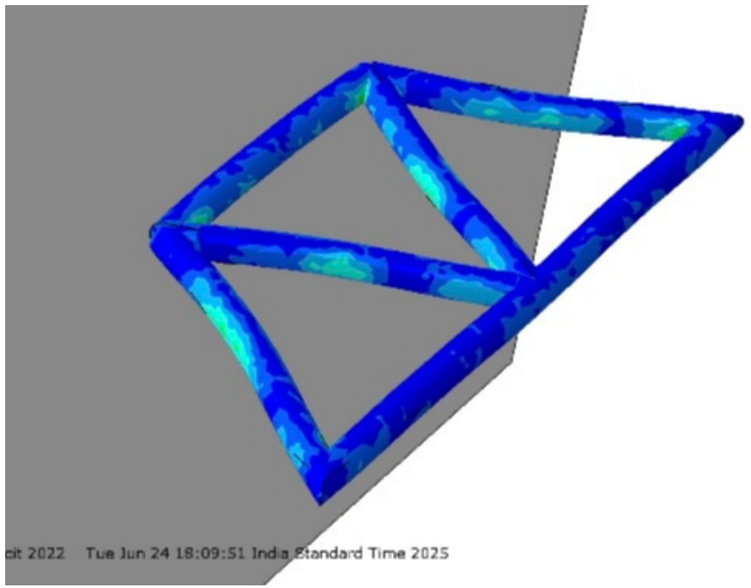
Point RP is fixed and the entire beam is given a pre-defined velocity



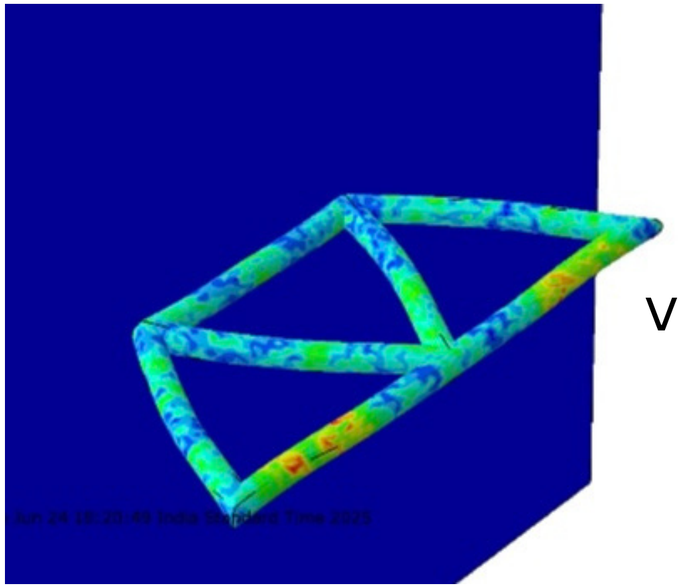
v = 50m/s



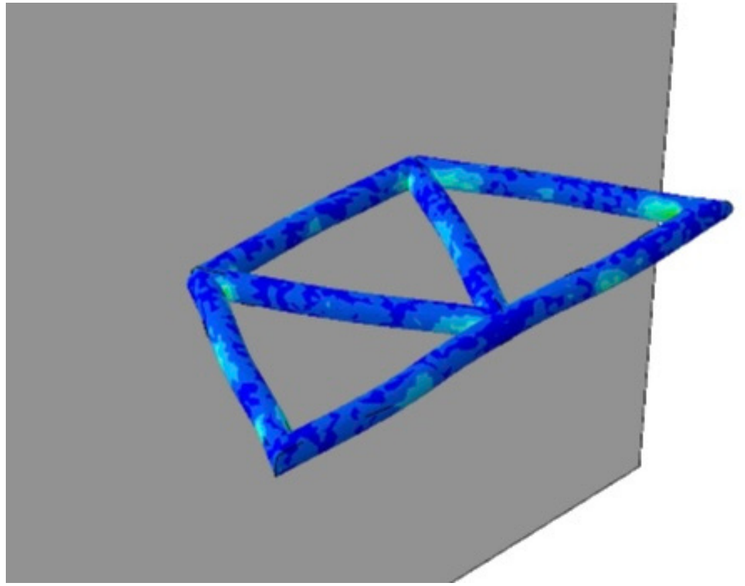
v = 100m/s



v = 150m/s

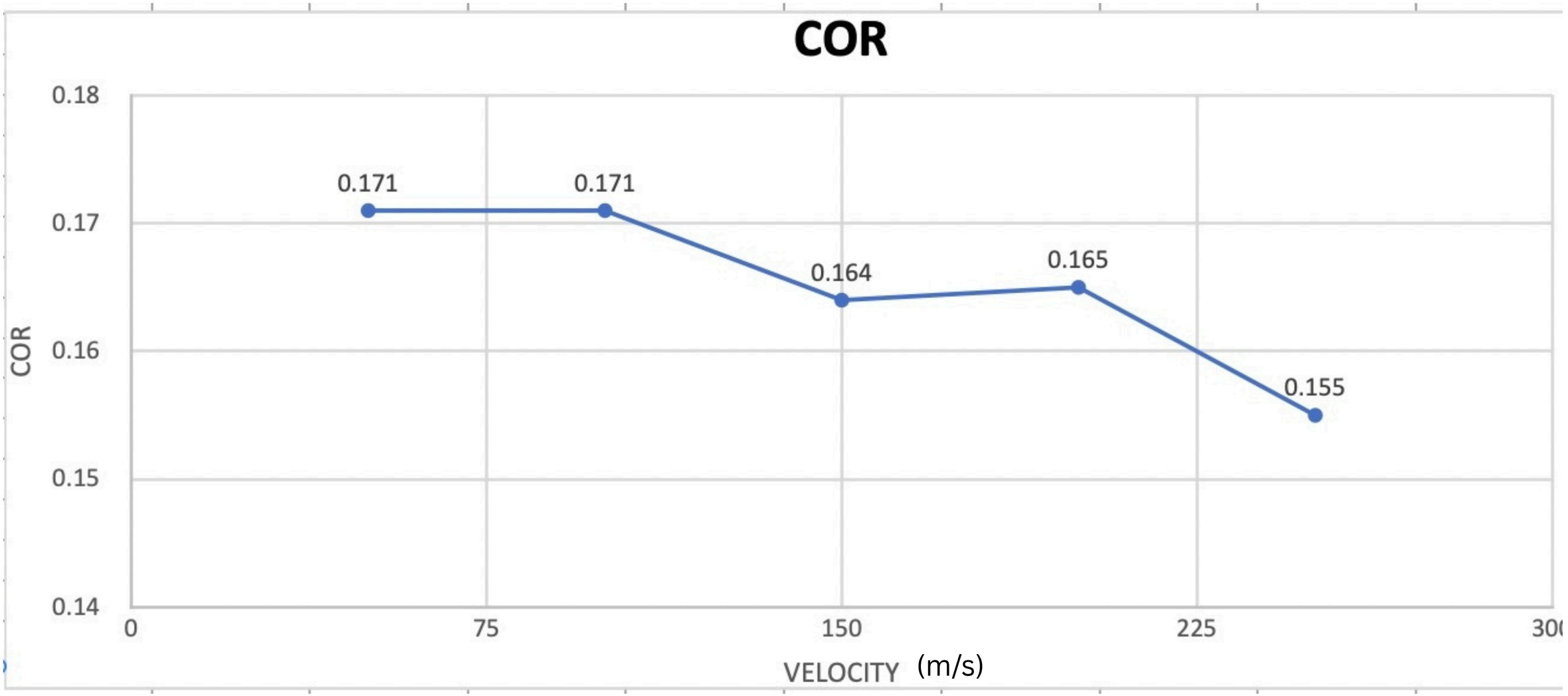


v = 200m/s

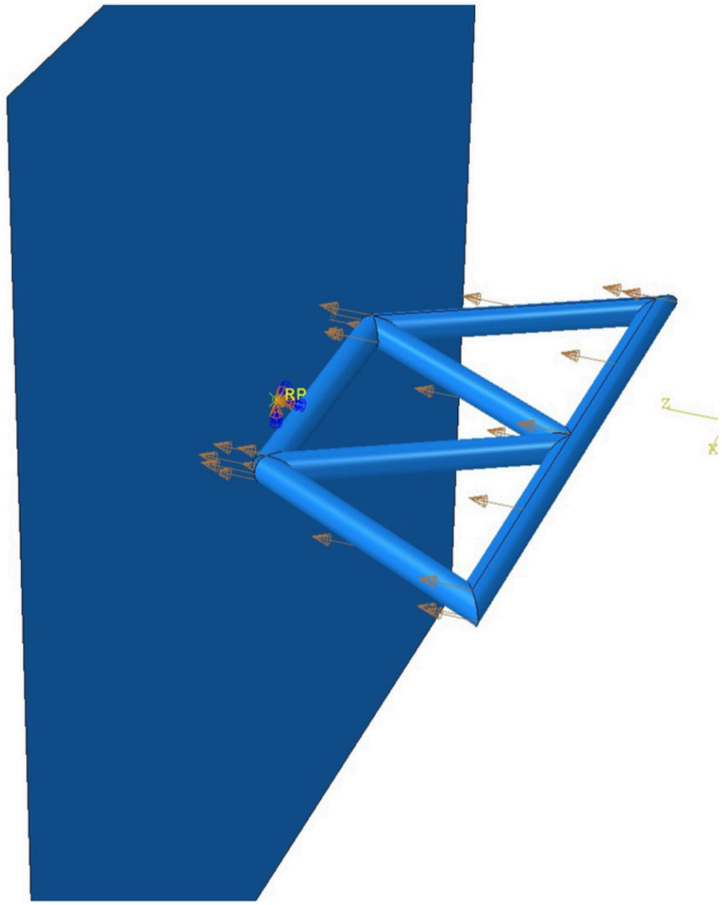


v = 250m/s

COR = coefficient of restitution.



Case 2 (Impacting perpendicular to the wall):



Properties:

Length of each cylindrical rod = 50m

Radius of each cylindrical rod = 5m

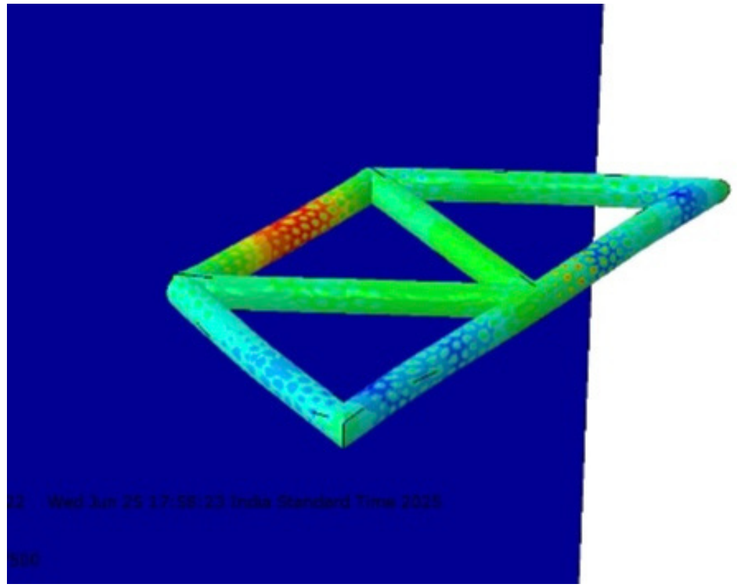
Young's modlus of material = 200GPa

Poisson's ratio = 0.3

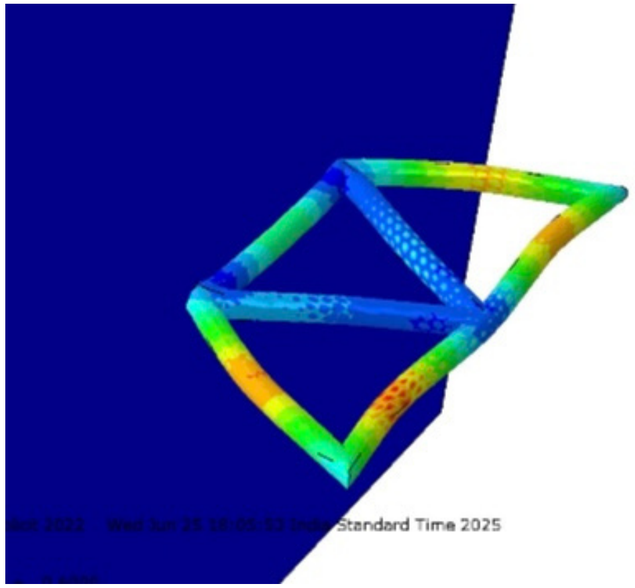
Coefficient of friction between wall and beam = 0.2

Yield stress of material = 250MPa

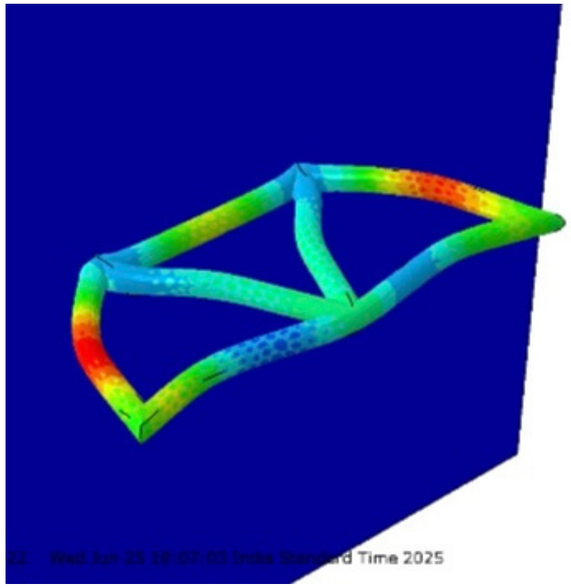
Point RP is fixed and the entire beam is given a pre-defined velocity



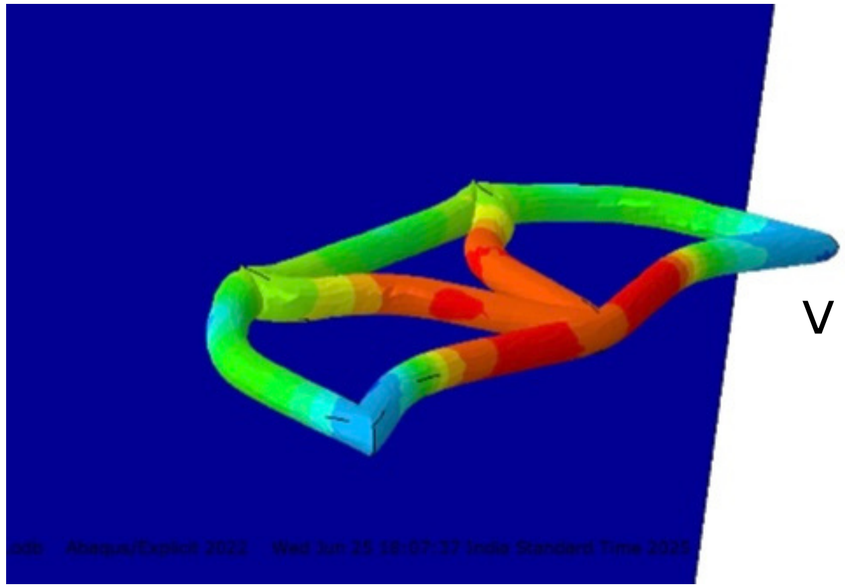
v = 50m/s



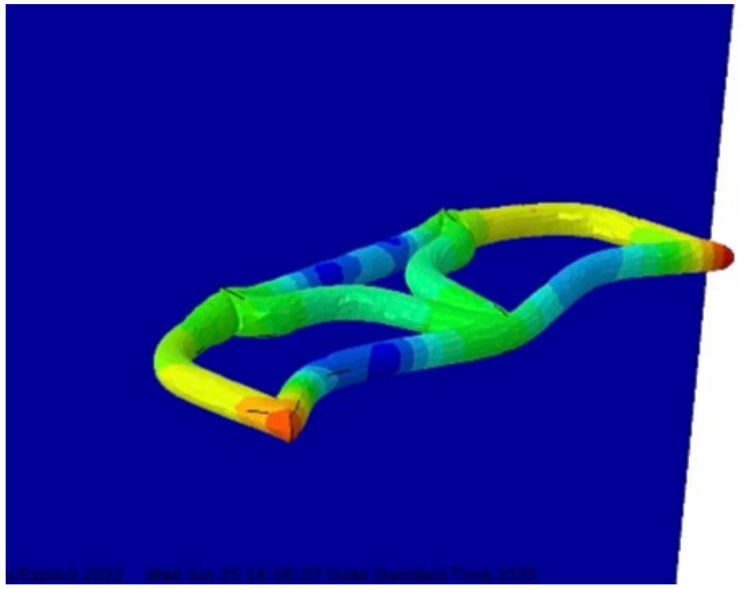
v = 100m/s



v = 150m/s

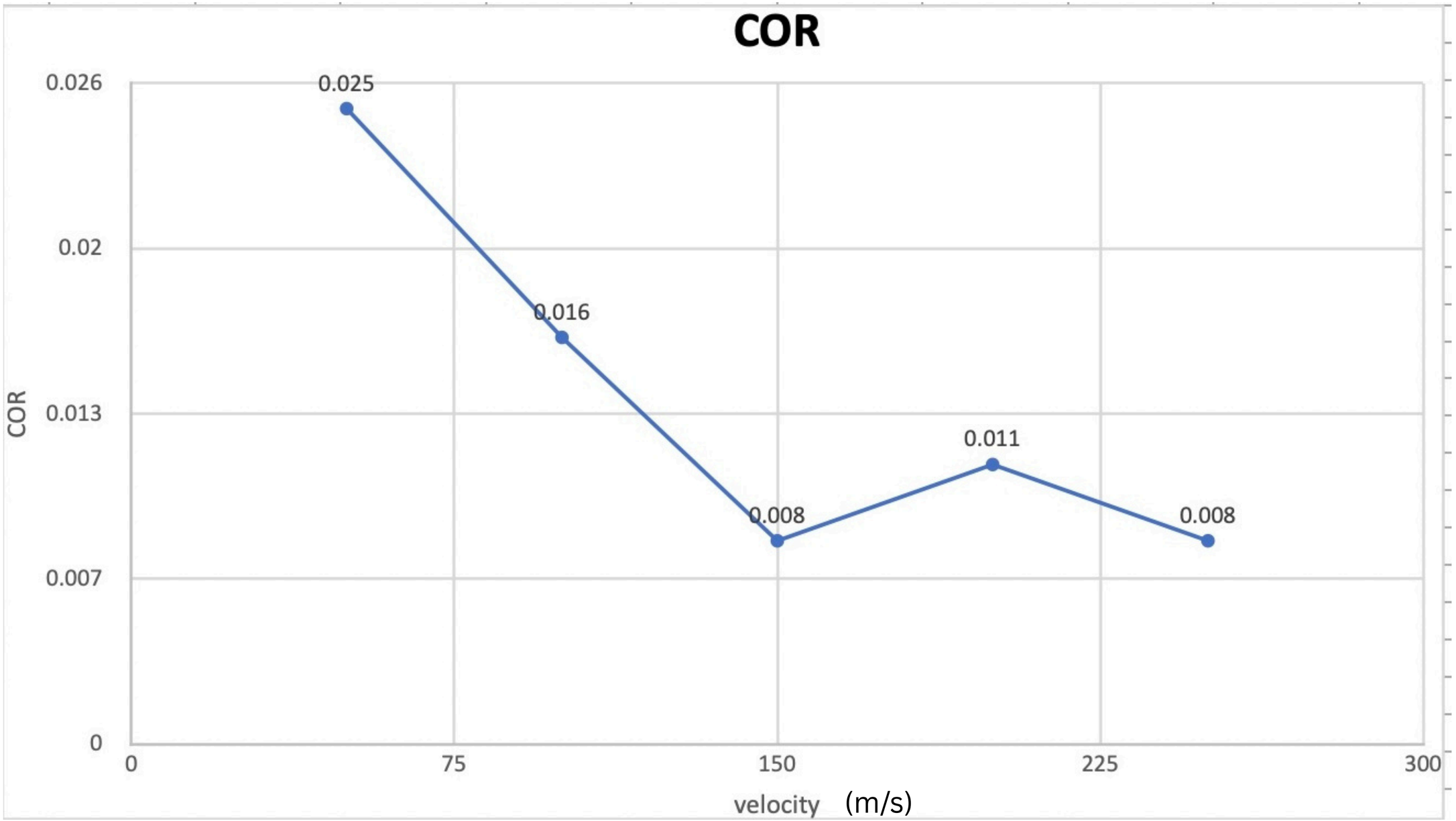


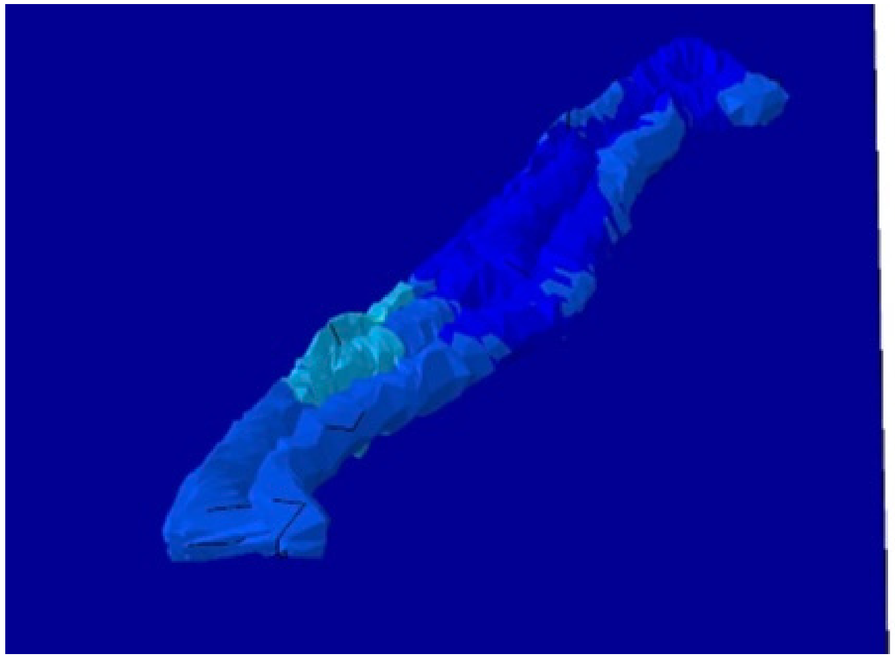
v = 200m/s



v = 250m/s

COR = coefficient of restitution.

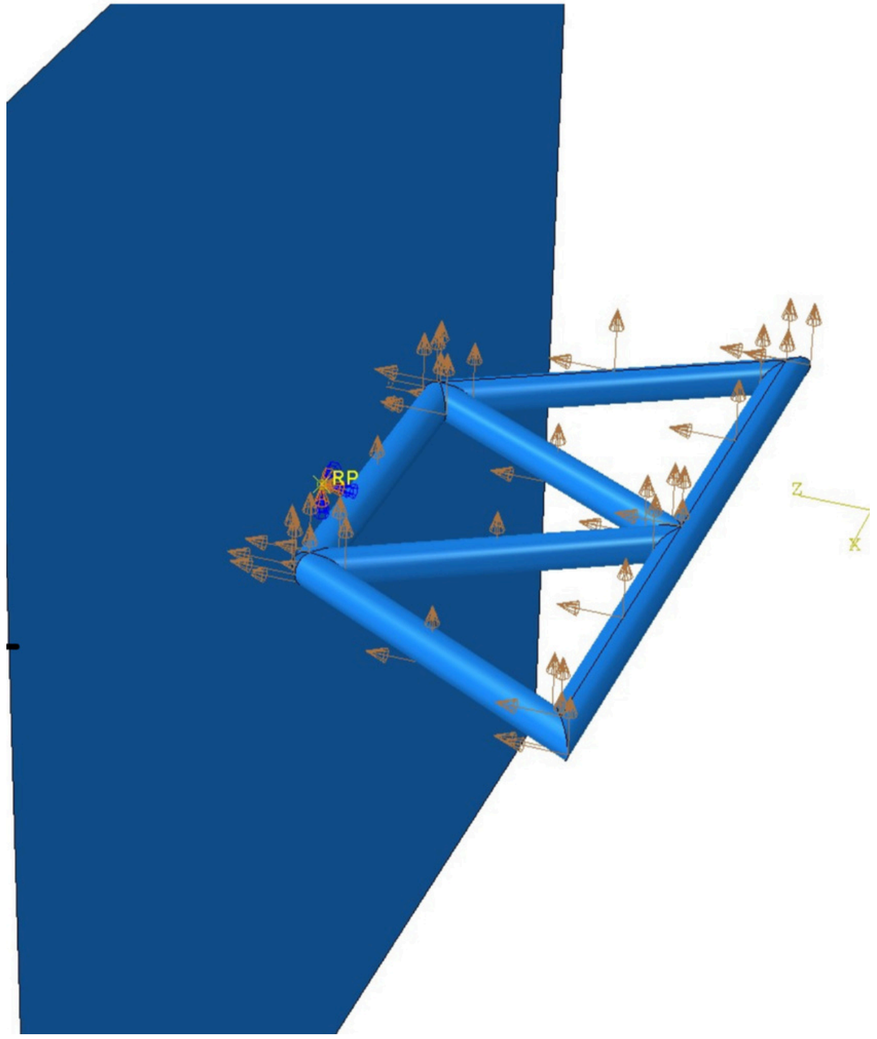




v = 750m/s

Coefficient of restitution ≈0

Case 3 (Impact at an angle of 45 degrees to the wall):



Properties:

Length of each cylindrical rod = 50m

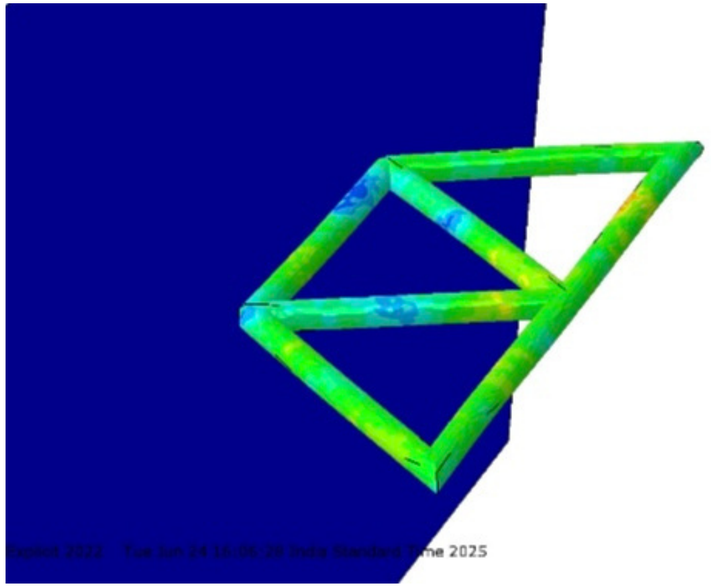
Radius of each cylindrical rod = 5m

Young's modlus of material = 200GPa

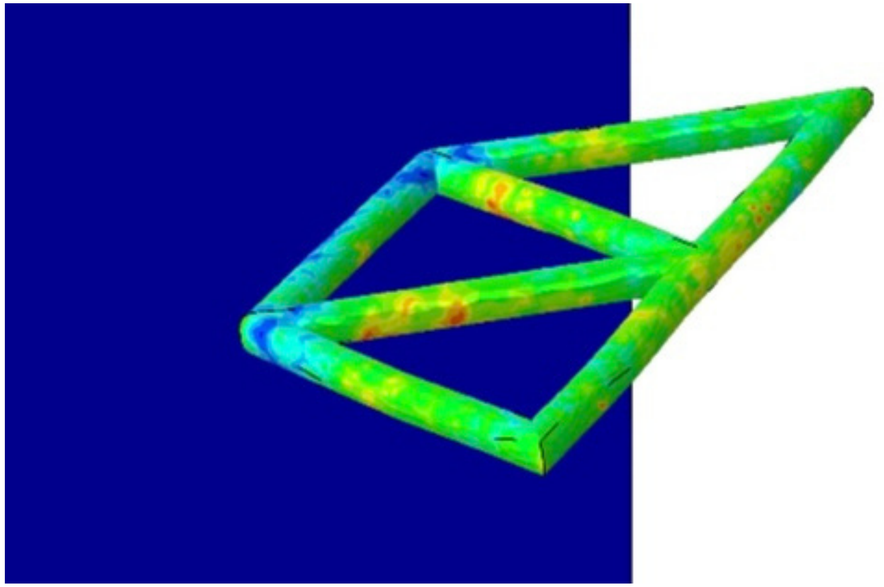
Poisson's ratio = 0.3

Coefficient of friction between wall and beam = 0.2

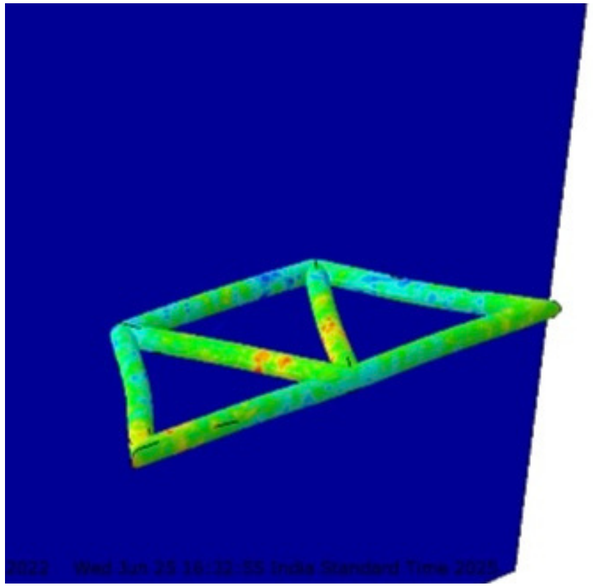
Point RP is fixed and the entire beam is given a pre-defined velocity



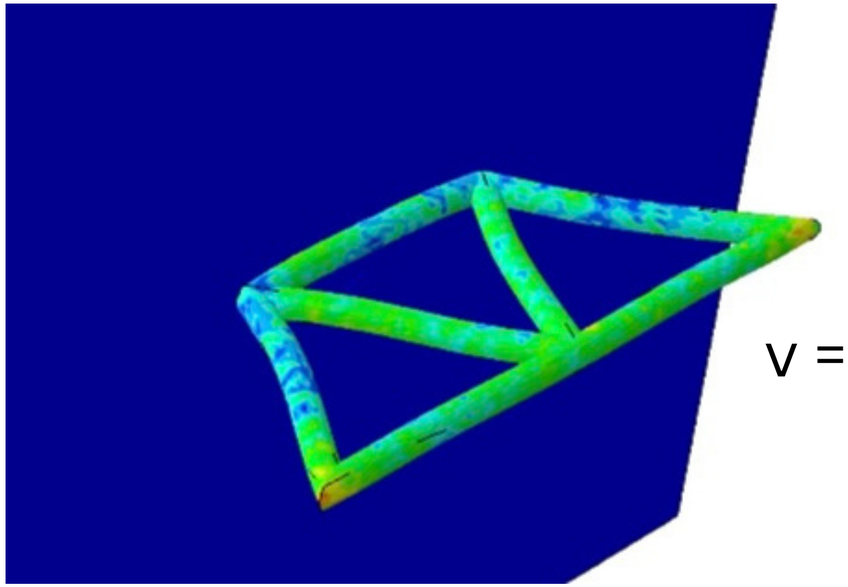
v = 50m/s



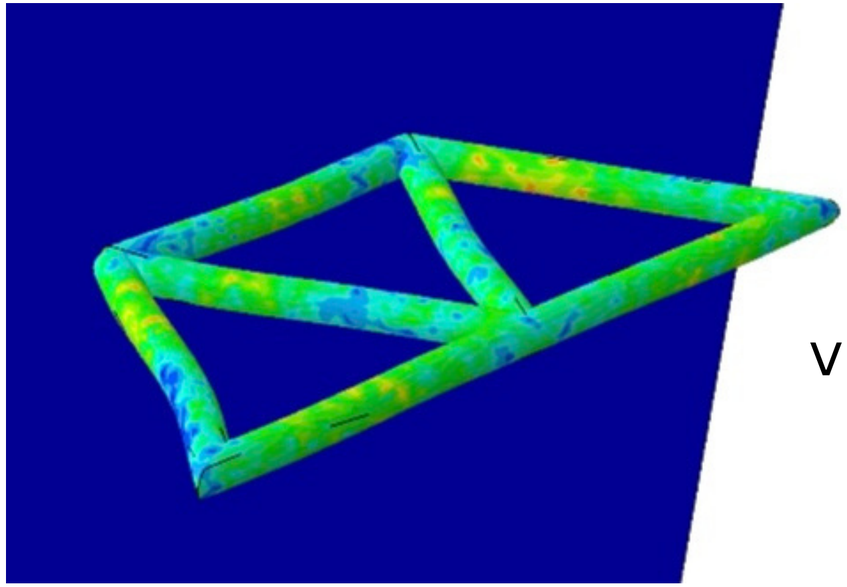
v = 100m/s



v = 150m/s

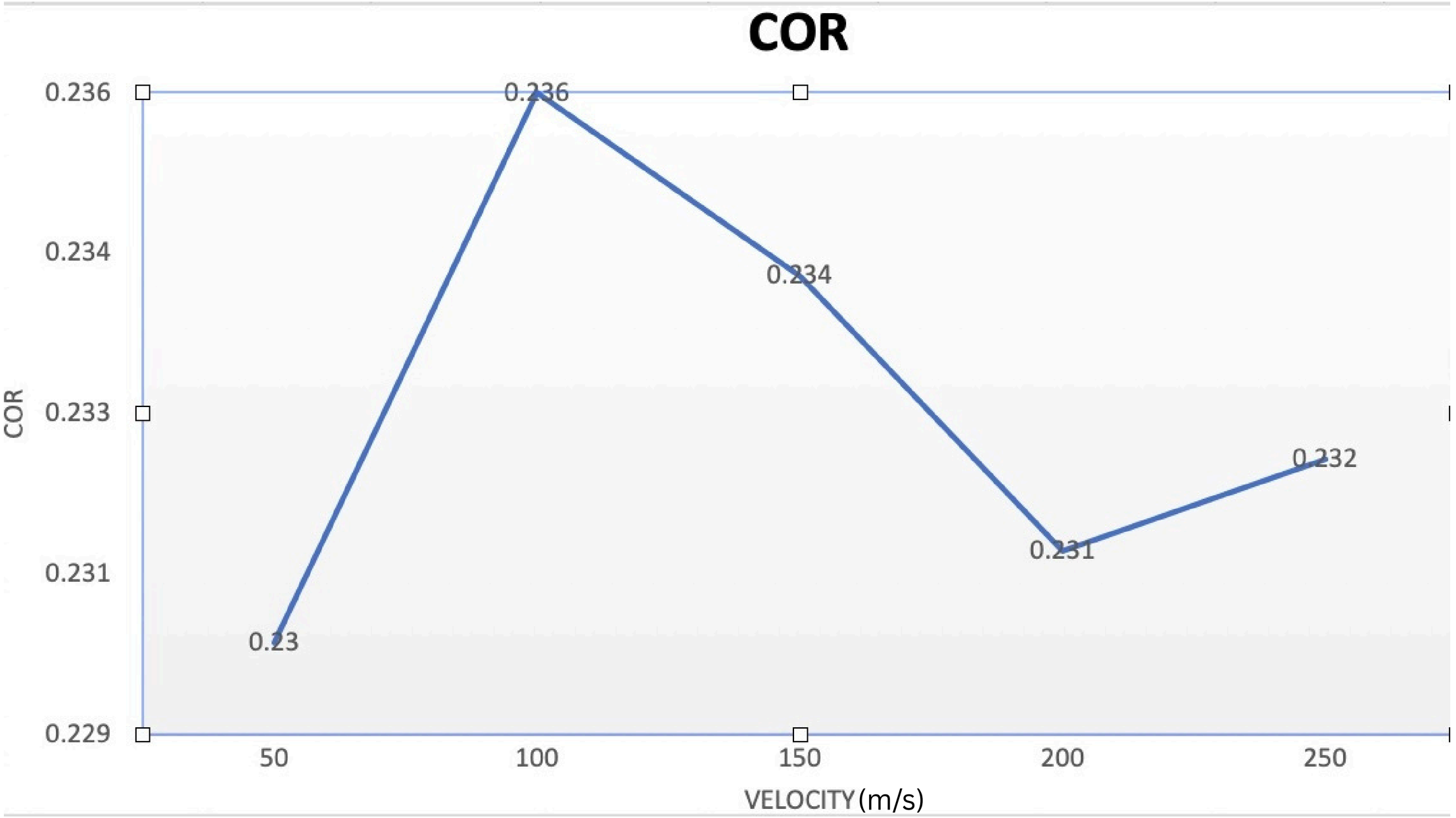


v = 200m/s

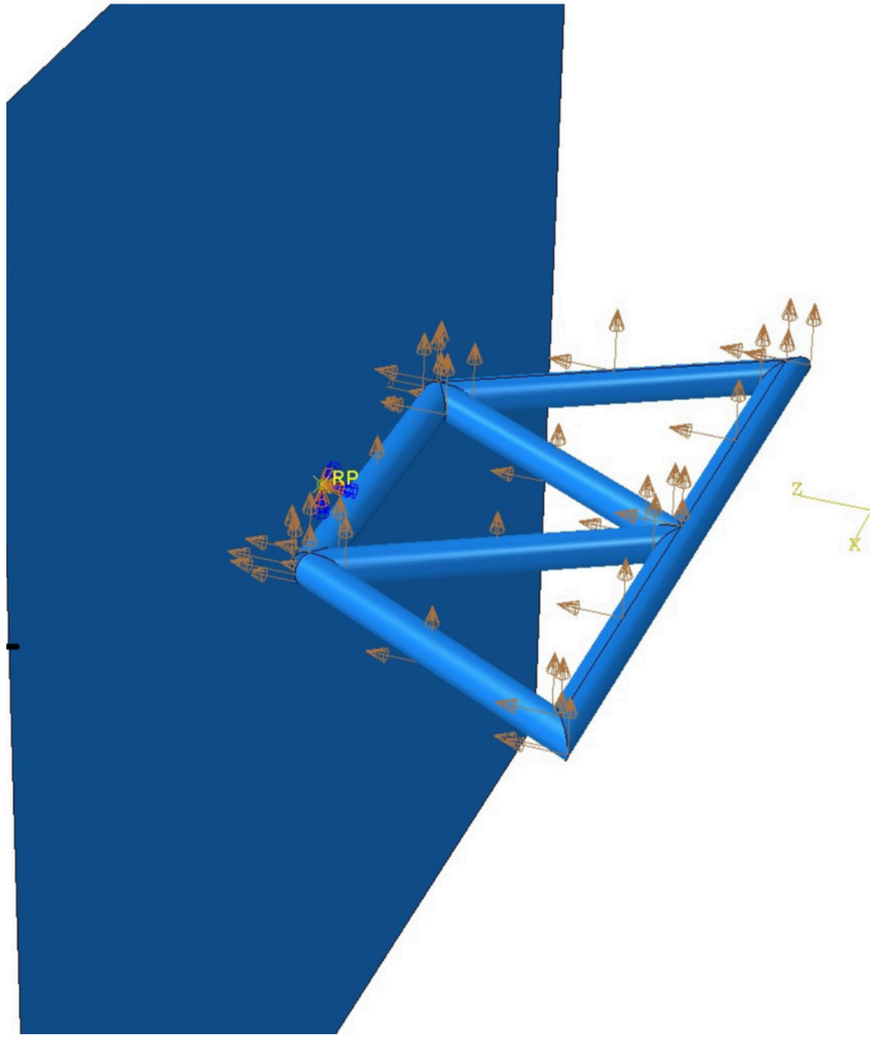


v = 250m/s

COR = coefficient of restitution.



Case 4 (Impact at an angle of 45 degrees to the wall):



Properties:

Length of each cylindrical rod = 50m

Radius of each cylindrical rod = 5m

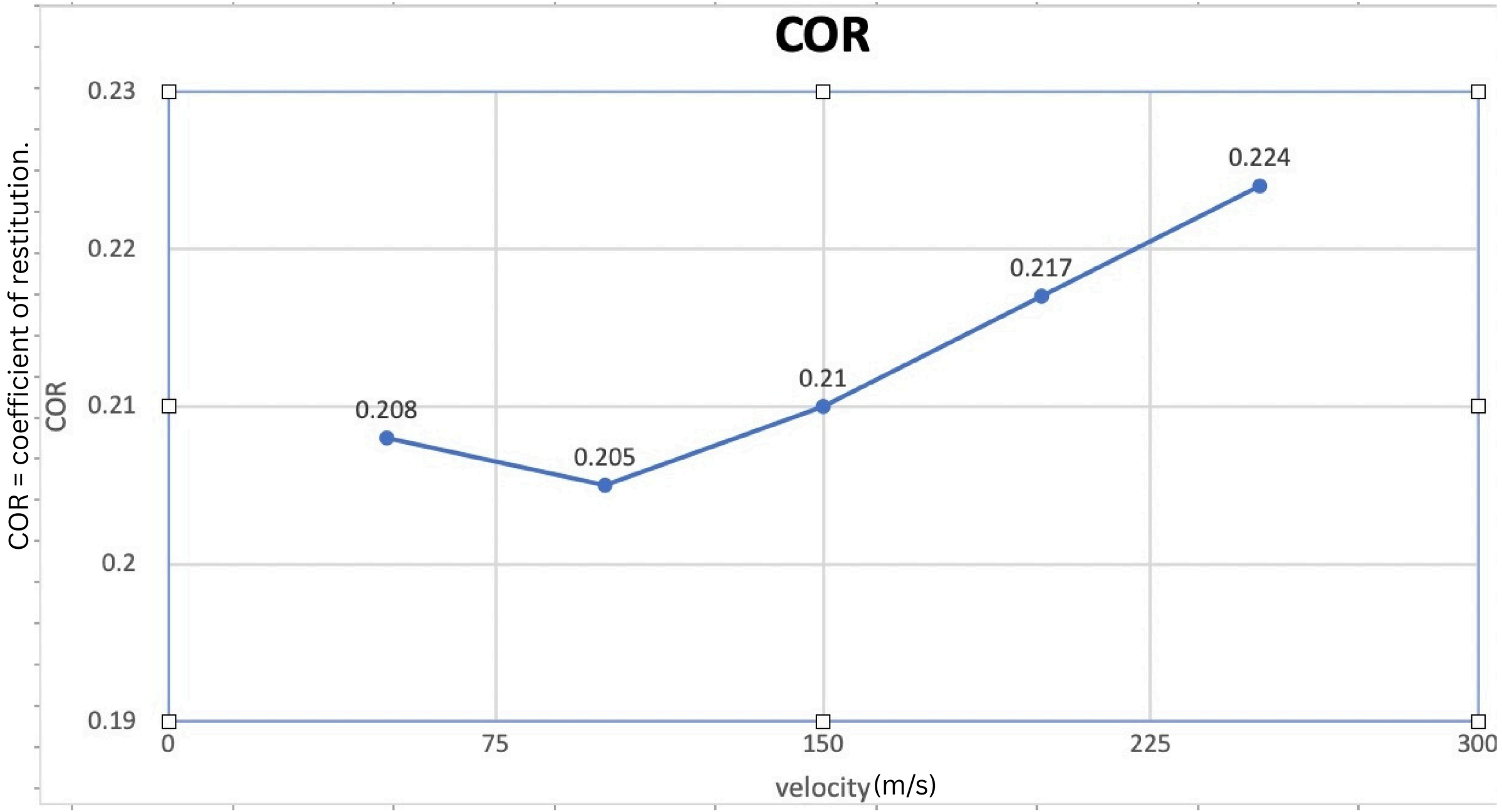
Young's modlus of material = 200GPa

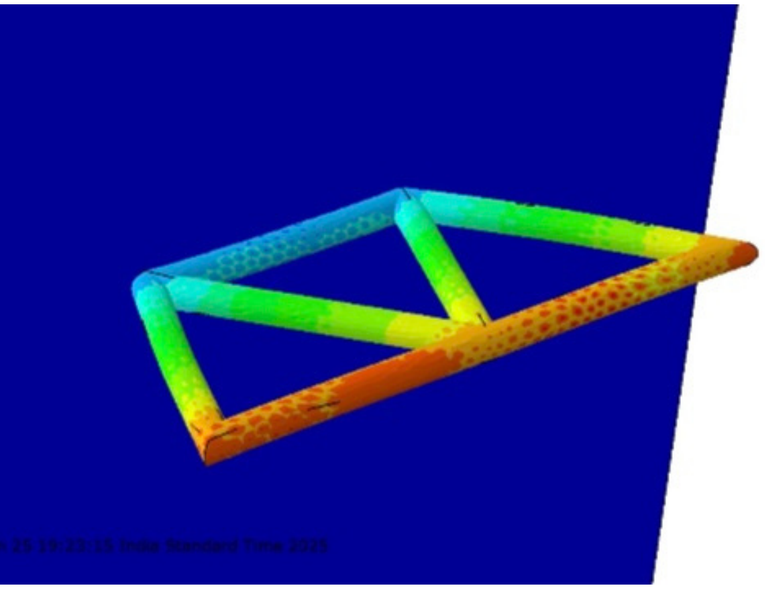
Poisson's ratio = 0.3

Coefficient of friction between wall and beam = 0.2

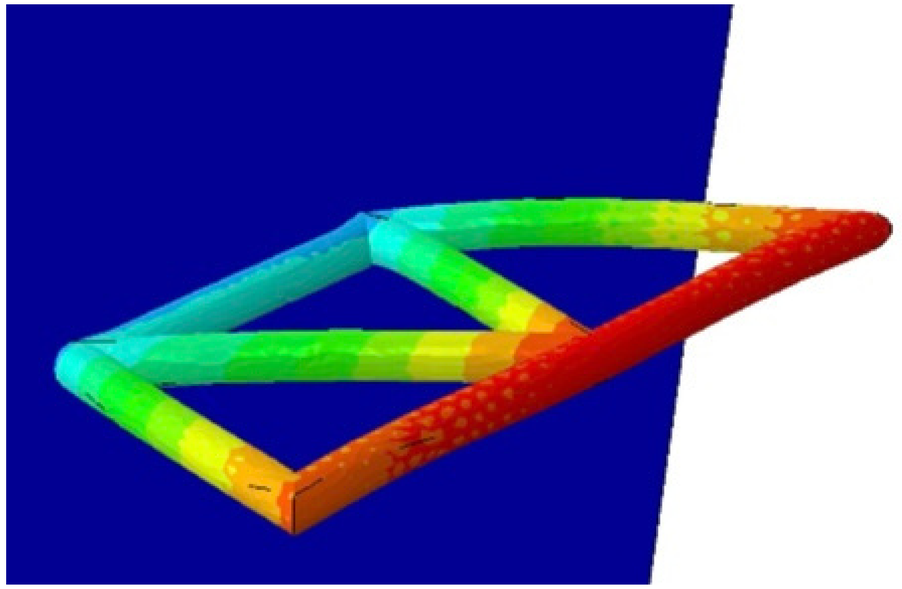
Yield stress of material = 250MPa

Point RP is fixed and the entire beam is given a pre-defined velocity

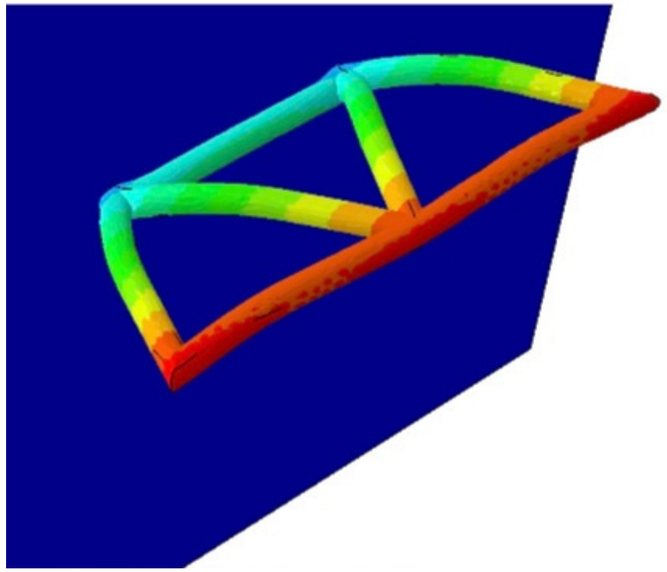

COR
COR = coefficient of restitution.
COR
0.23
0.22
0.21
0.2
0.19
0.208
0.205
0.21
0.217
0.224
0
75
150
225
300
velocity (m/s)



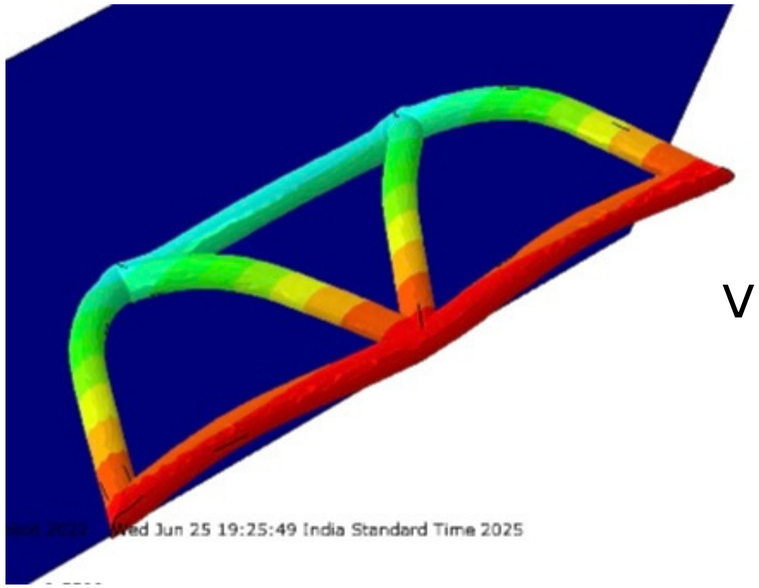
v = 50m/s



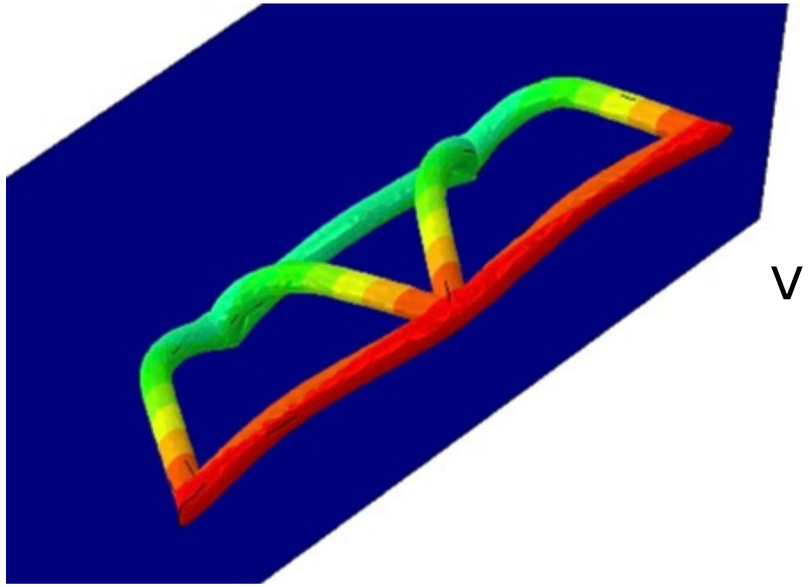
v = 100m/s



v = 150m/s



v = 200m/s



v = 250m/s