

# Fluid Structure Interaction (FSI) of Double Curvature Arch Dam Under Seismic Loading By the Application of Added Mass Technique and Acoustic Elements

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**Added Mass Technique** - The mass and its distribution are relevant for calculating the dynamic analysis during the Earthquake. The water joined to the body dam is added to the points of the upstream face as an additional concentrated mass according to Westergaard's approach

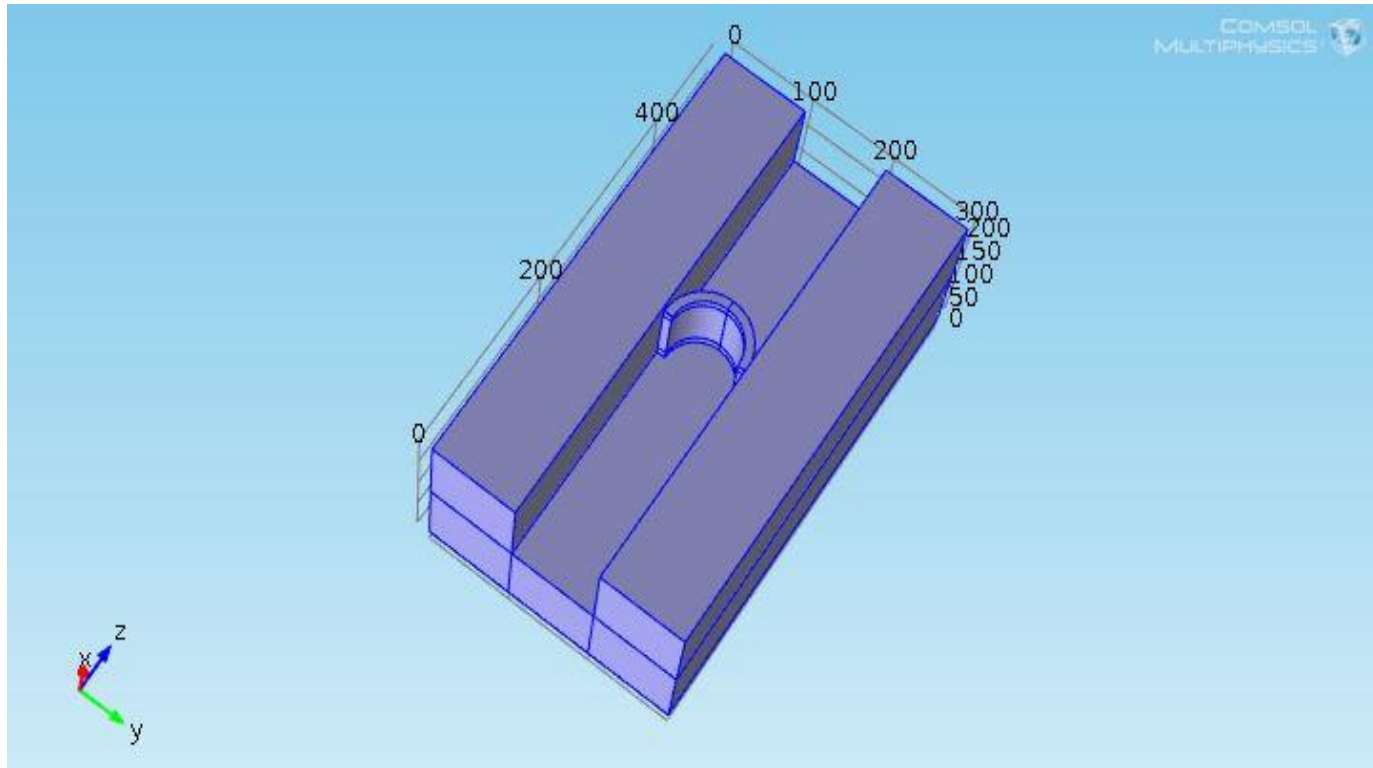
**Acoustic Elements** - Pressure variations in the fluid domain by the transmission of sound for the waves

# Background and Motivation

The impact of load on the upstream face of the dam is obtained by the computation of stress and displacements for the double curvature Arch dam considering compression of fluid element

Application of COMSOL Multiphysics in a new area of scope.

# Dam Model



# Model Properties

Domain	Density [kg/m <sup>3</sup> ]	Poisson ratio	Young modulus [MPa]
Dam Body	2300	0.33	25000
Rock Strata	2600	0.25	60000

Domain	Density [kg/m <sup>3</sup> ]	Speed of sound in water[m/s]	Bulk modulus [MPa]
Reservoir	1000	1500	2200

# Modeling Interfaces

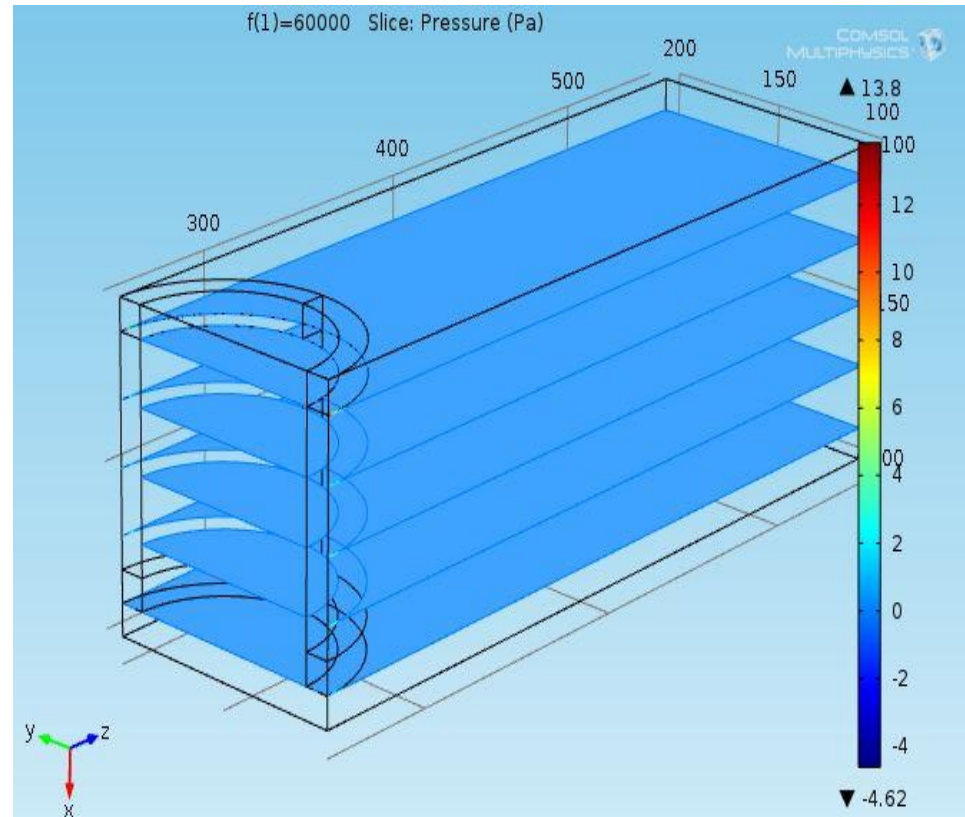
- Solid Mechanics
- Acoustic-Solid Interaction Frequency Domain
- Fluid- Structure Interaction

# Results

1. Slice Pressure
2. Displacement
3. Von Mises stress
4. Velocity magnitude on the U/S of the dam
5. Von mises stress on the U/S of the dam

# Results

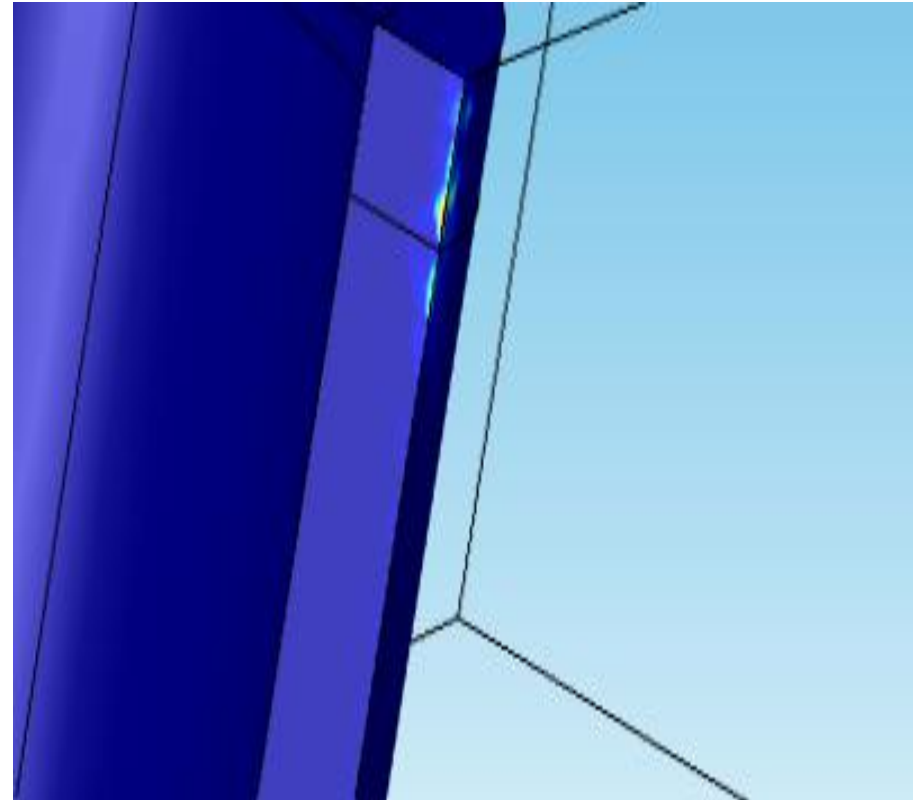
Total Slice pressure is maximum at the top side joints of the dam body.





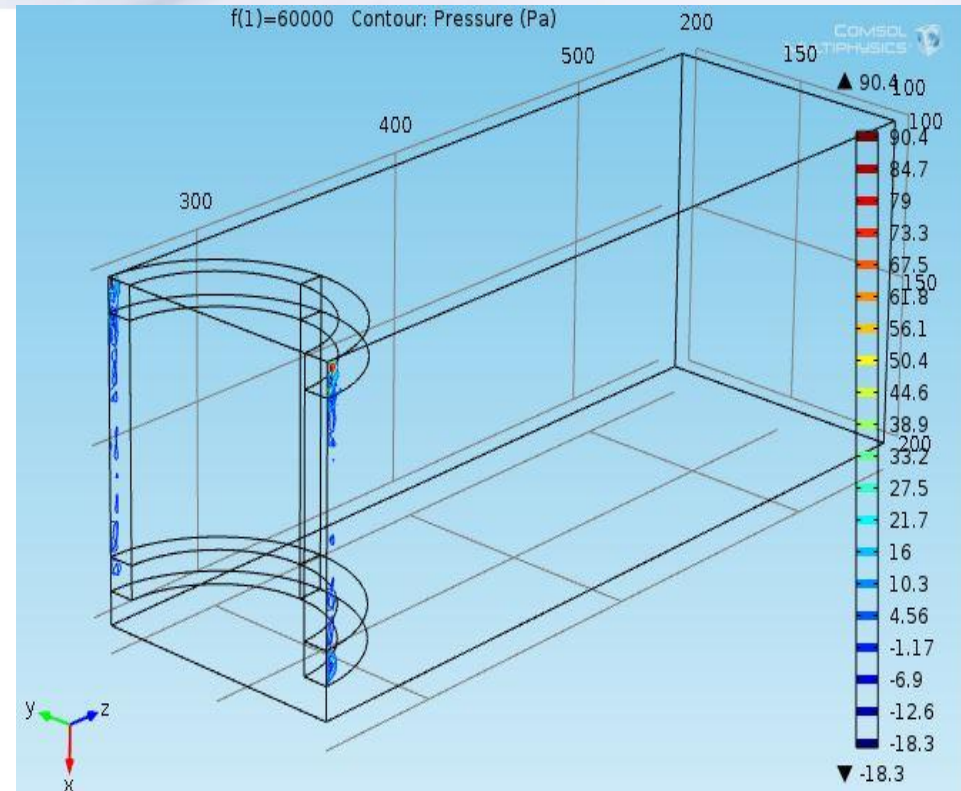
# Results

Maximize picture of  
total Slice pressure



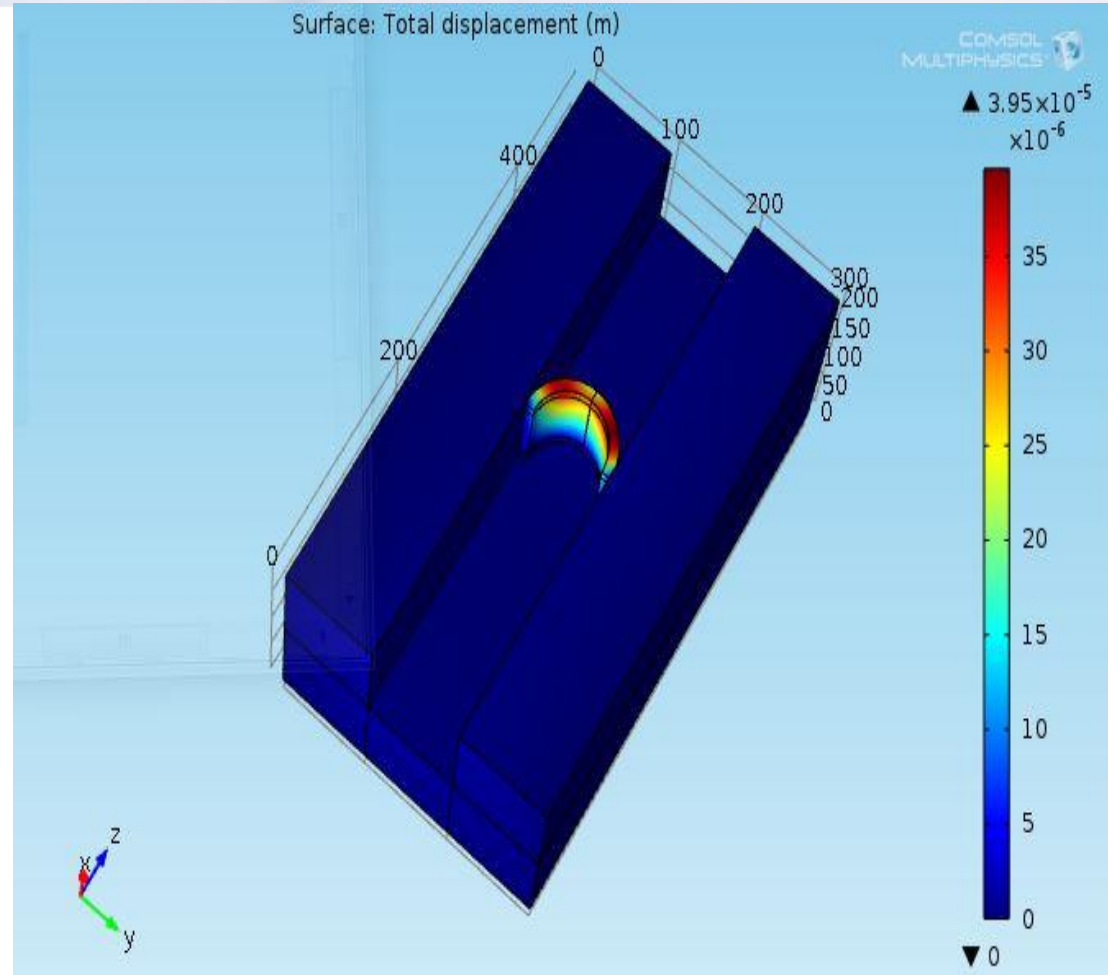
# Results

Contour pressure is minimum at the bottom and maximum at the top of the dam body.



# Results

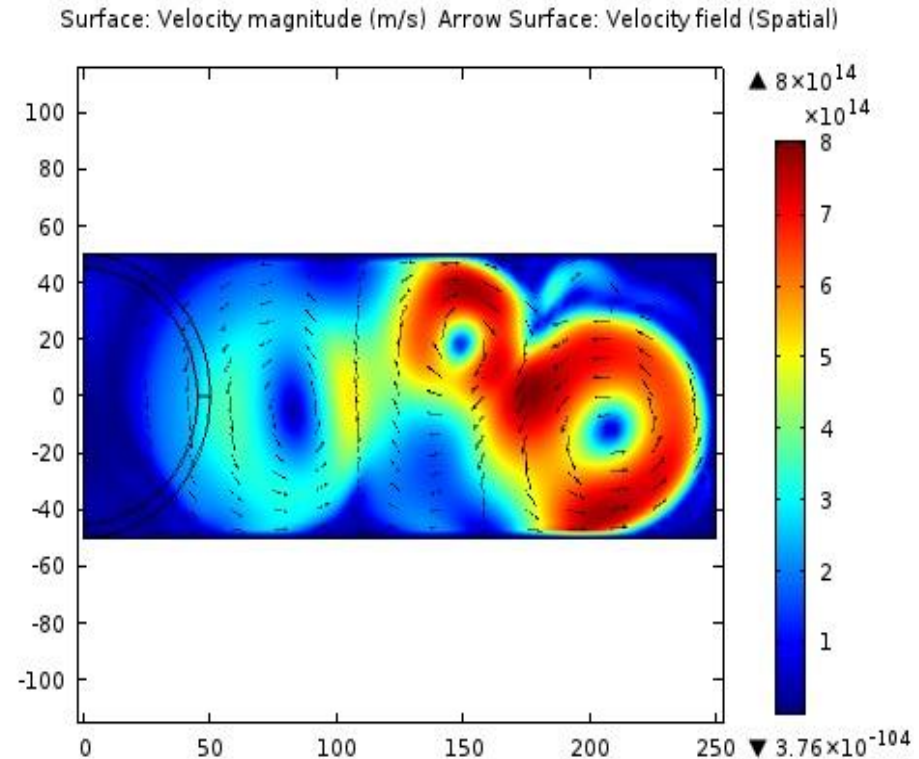
Total displacement of the dam = 0.35 cm





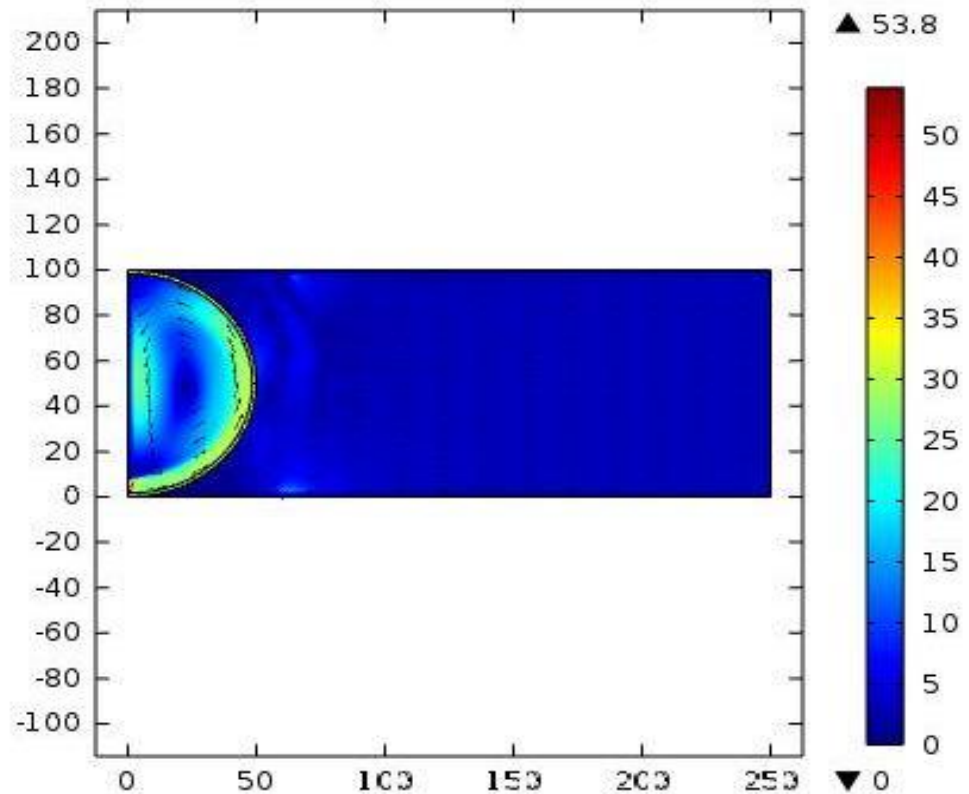
# Results

Velocity magnitude is maximum on the U/S of the dam and it goes on decreasing towards the body of the dam.



# Results

Von mises stress are maximum on the surface of the dam body.





# Thank you....