Fluid Structure Interaction of Arch Dam on Full Reservoir Level under Seismic Loading

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Introduction: The analysis of seismic, stability and deformation of a dam system is an important factor in the field of earthquake engineering, Bering in mind the recent earthquake events, this commission has proposed to evaluate in the seismic behavior of a large concrete arch dam, taking into account the fluid-structure interaction of double curvature interaction In this paper the solution obtained using COMSOL Multi physics is presented in details, outlining the main potentialities of the software in solving the acoustic pressure and acoustic structure interaction for corresponding impound water on the upstream side of the dam

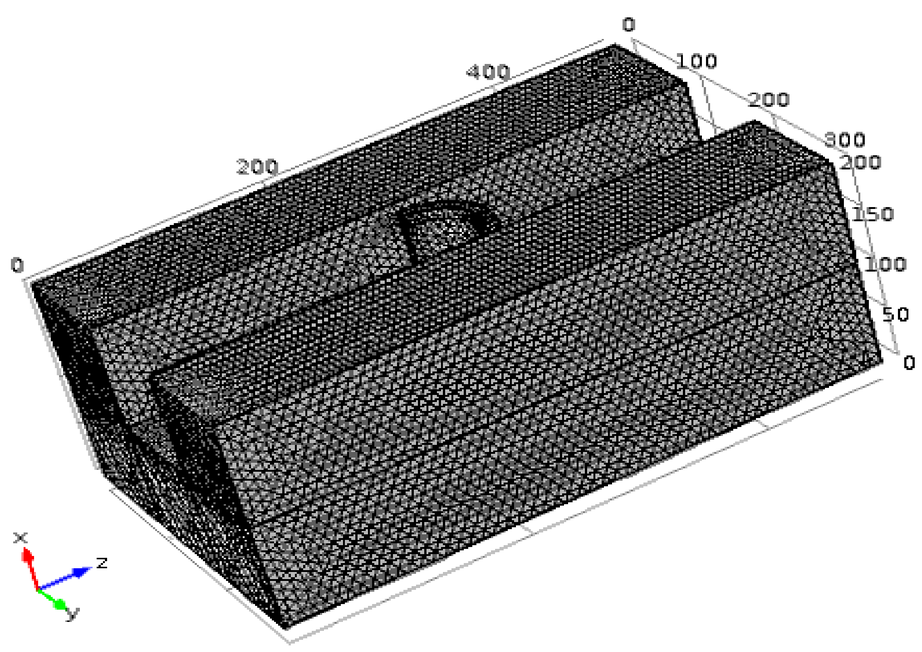

Figure 1. Arch Dam Mesh Model

Computational Methods: Describe your approach to the problem at hand. It might be a good idea to show the important equations that you are solving for. You may also refer to the physics interfaces that you used for the simulation.

$$\rho(\partial u/\partial t)\ \nabla\ [-pI+\eta(\nabla u+(\nabla u)\ T\ )]+\rho(\ (\ u-u\ m\ )\ \nabla)u=F-\nabla\cdot u=0$$

Results: The 2D model geometry consists of a horizontal flow channel in the middle of which is an obstacle, a Dam body structure (Figure 1). The fluid flows from Right to Left on the U/S side, and it imposes a force on the structure's walls resulting from the viscous drag and fluid pressure. The structure, being made of an un deformable material, under the applied load. Consequently

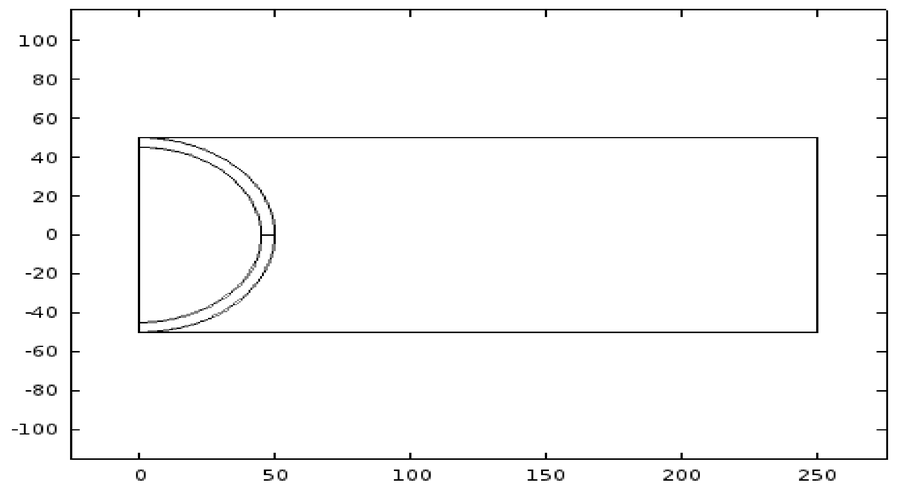

Figure 2 -2D dam body in U/S model

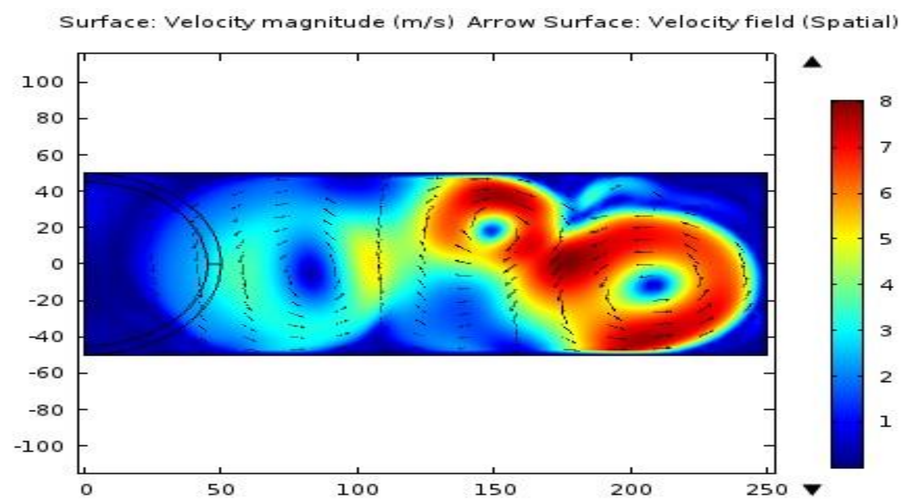

Figure 3. Velocity magnitude on the U/S of the dam

Conclusions: The Navier-Stokes equations that solve the flow are formulated for this moving coordinates.The structural mechanics portion of the model is solved by COMSOL Multiphysics with its fixed coordinate system as usual.

References:

1. COMSOL Multiphysics, Acoustic Module –User's Guide, Version 4.4 (2013)
2. Transiant Analysis of Dam-Reservoir Interaction,2012 IACSIT Conferences,Singapore