

## **Fluid-Structure Coupling Analysis and Simulation of Coriolis Mass Flowmeter**

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**Abstract:** Coriolis mass flowmeters (CMFs) are increasingly used in the oil and gas industry with feature of directly measuring mass flow rate. The performance of CMFs influenced by on-line viscosity still needs further study. A computational fluid dynamics model of U-shape CMF was developed. The simulation results were evaluated in terms of the natural frequency of the vibrating system and the corresponding phase difference between the motion of the sensing points symmetrically located on the measuring tube. The simulations were conducted on comparison between Newtonian liquids (water) and non-Newtonian liquids (viscous solutions) with flow rates spanning the laminar and turbulent regions. The effects of viscosity on mass flow measurement by CMFs are discussed in details. The findings in the simulations can be used for further compensation of deviation due to viscosity effects.

**Keywords:** Coriolis mass flowmeter, Fluid-structure interaction, High viscosity, Non-Newtonian liquid, Mass flow rate