

ABSTRACT

Whether one looks inward into the human body or outwards into outer space fluid structure interaction is evident. A variety of numerical methods have been used to determine the key characteristic features that accompany fluid structure interaction. Many of these methods rely on body-fitted techniques to setup the computational mesh. The computational costs resulting from the use of these methods are quite prohibitive. As a consequence there has been a mushrooming of immersed boundary methods, which apply fixed Cartesian meshes. In particular, the direct forcing immersed boundary method has gained popularity due to the simplicity with which the forcing function is formulated. In the following, we present different scenarios that have been used as setups for testing the robustness of the direct forcing immersed boundary method. The method has been applied to the interaction between uniform fluid flow and both stationary and moving rigid bodies. Further, the method has also been trialed on the interaction between oscillatory fluid flow and rigid bodies. Vorticity patterns have been provided to detail the mechanism of the fluid structure interaction. Amplitude and frequency response data are also presented precisely to highlight their behavior at various reduced velocities. The results acquired have been found to be comparable to published experimental and alternative numerical data