

Automatic Fluid-Structure Interaction Modeling and Analysis of Butterfly Valve Using Python Script

Authors : N. Guru Prasath, Sangjin Ma, Chang-Wan Kim

Abstract : A butterfly valve is a quarter turn valve which is used to control the flow of a fluid through a section of pipe. Generally, butterfly valve is used in wide range of applications such as water distribution, sewage, oil and gas plants. In particular, butterfly valve with larger diameter finds its immense applications in hydro power plants to control the fluid flow. In-lieu with the constraints in cost and size to run laboratory setup, analysis of large diameter valves will be mostly studied by computational method which is the best and inexpensive solution. For fluid and structural analysis, CFD and FEM software is used to perform large scale valve analyses, respectively. In order to perform above analysis in butterfly valve, the CAD model has to recreate and perform mesh in conventional software for various dimensions of valve. Therefore, its limitation is time consuming process. In-order to overcome that issue, python code was created to outcome complete pre-processing setup automatically in Salome software. Applying dimensions of the model clearly in the python code makes the running time comparatively lower and easier way to perform analysis of the valve. Hence, in this paper, an attempt was made to study the fluid-structure interaction (FSI) of butterfly valves by varying the valve angles and dimensions using python code in pre-processing software, and results are produced.

Keywords : butterfly valve, flow coefficient, automatic CFD analysis, FSI analysis

Conference Title : ICMEDA 2017 : International Conference on Mechanical Engineering Design and Analysis

Conference Location : Mumbai, India

Conference Dates : February 07-08, 2017