

Study of Cavitation Phenomena Based on Flow Visualization Test in 3-Way Reversing Valve

Authors : Hyo Lim Kang, Tae An Kim, Seung Ho Han

Abstract : A 3-way reversing valve has been used in automotive washing machines to remove remaining oil and dirt on machined engine and transmission blocks. It provides rapid and accurate changes of water flow direction without any precise control device. However, due to its complicated bottom-plug shape, a cavitation occurs in a wide range of the bottom-plug in a downstream. In this study, the cavitation index and POC (percent of cavitation) were used to evaluate quantitatively the cavitation phenomena occurring at the bottom-plug. An optimal shape design was carried out via parametric study for geometries of the bottom-plug, in which a simple CAE-model was used in order to avoid time-consuming CFD analysis and hard to achieve convergence. To verify the results of numerical analysis, a flow visualization test was carried out using a test specimen with a transparent acryl pipe according to ISA-RP75.23. The flow characteristics such as the cavitation occurring in the downstream were investigated by using a flow test equipment with valve and pump including a flow control system and high-speed camera.

Keywords : cavitation, flow visualization test, optimal shape design, percent of cavitation, reversing valve

Conference Title : ICFMA 2016 : International Conference on Fluid Mechanics and Applications

Conference Location : Copenhagen, Denmark

Conference Dates : August 15-16, 2016