

Chonlatid Bumrungwat 2014: A Study on Flow Characteristics of Water Mixed with Liquid Crystals in Diffuser. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering.

Thesis Advisor: Associate Professor Chawalit Kittichaikarn, Ph.D. 131 pages.

This thesis presents the simulation of two-phase flow in diffuser with Liquid Crystals suspended in water by using Computational Fluid Dynamics program. The objective is to compare the computational results with the experimental results obtained from using PIV in Titanium Dioxide suspended in water. The water contained 3-micron Titanium Dioxide as tracking particle at 0.1 percent by weight. Fluid flowed through diffuser at the Reynolds Number of 13,000. Experimental data was used to create a two-dimensional model with 2,142 meshes. The simulation was set for two-phase flow, liquid and solid. Liquid Crystals were suspended in fluid with various size and solid's concentration at 10-100 micron and 0.1-10 percent by weight, respectively.

From comparison between simulation of Liquid Crystals and Titanium Dioxide suspended in water, it was found that the error was less than 2 percent. The comparison of Liquid Crystals' size between 10 and 100 micron showed that the difference in velocity was not exceeding 0.1 percent. It was also found that Liquid Crystals' concentration between 3.5 to 4 percent by weight compared with Titanium Dioxide had error less than 0.1 percent. So, the application of using Liquid Crystals instead of Titanium Dioxide was approval. Moreover, Liquid Crystals can be used to reveal the flow characteristic both velocity and temperature at the same time.

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