

Comparison on experimental and simulation result on drag reducing effect of low concentration chitosan in turbulent flow

ABSTRACT

Polymeric drag reducing agent (DRA) is widely used in various industries due to its ability to enhance fluid flow inside a pipe. The drag reduction (DR) caused by the addition of chitosan extracted from shrimp shell has been recently discovered and shows a promising potential as DRA. In this study, the drag reducing effect of low concentration chitosan was observed and compared with a simulation done using HYSIS software. The experiment is conducted in a closed loop circulation system where water is the transporting medium. The pipe system consists of polyvinyl chloride (PVC) pipes with 0.013 m, 0.025 m and 0.038 m diameter. The chitosan was tested in five different concentrations. It was found that the highest DR obtained from experiment and simulation are 32% and 29% respectively which both obtained from the 0.038 m pipe with 30 ppm concentration. Both experimental and simulation results on DR show similar pattern with slight difference in value. In overall, it was found that low concentration DRA can reduce the formation of drag. The drag reduction increased as the concentration of chitosan increased and larger pipe diameter produced higher percentage of drag reduction.