Utilization of Schnerr-Sauer Cavitation Model for Simulation of Cavitation Inception and Super Cavitation

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Abstract : In this study, the Reynolds-Stress-Navier-Stokes framework is utilized to investigate the flow inside the diesel injector nozzle. The flow is assumed to be multiphase as the formation of vapor by pressure drop is visualized. For pressure and velocity linkage, the coupled algorithm is used. Since the cavitation phenomenon inherently is unsteady, the quasi-steady approach is utilized for saving time and resources in the current study. Schnerr-Sauer cavitation model is used, which was capable of predicting flow behavior both at the initial and final steps of the cavitation process. Two different turbulent models were used in this study to clarify which one is more capable in predicting cavitation inception and super-cavitation. It was found that K-ε was more compatible with the Shnerr-Sauer cavitation model; therefore, the mentioned model is used for the rest of this study.

Keywords : CFD, RANS, cavitation, fuel, injector
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