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**Large Eddy Simulation of Cavitation Inception in a High Speed Flow Over an Open Cavity**[1] EHSAN SHAMS, SOURABH APTE, Oregon State University — Large-eddy simulation of flow over an open cavity corresponding to the experimental setup of Liu and Katz [Liu & Katz, PoF 2008] is performed using a co-located grid finite-volume solver. The flow Reynolds number based on the cavity length and the free stream velocity is $170,000$. The flow statistics, including mean and rms velocity fields and pressure coefficients, are compared with the experimental data to show good agreement. Cavitation inception was investigated using two approaches: (i) a discrete bubble model for gaseous cavitation based on solving the Rayleigh-Plesset equations using an adaptive time-stepping procedure, and (ii) a scalar transport based model for vaporous cavitation. Sensitivity to the model parameters was investigated by varying the model parameters and by changing the cavitation index. Both models predict that the cavitation inception occurs near the trailing edge similar to that observed in the experiments. A periodic growth and decay of bubble size and liquid vapor fraction is observed above the trailing edge owing to local variations in pressure minima. The probablity distribution functions and average number of bubbles undergoing cavitation predict an inception index of 0.9 that agrees well with the experimental data.

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