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**Internal Flow Analysis in an Axial Pump using Large-eddy Simulation with Immersed Boundary Method** DANDAN YANG, University of Minnesota; Tsinghua University, XIANWU LUO, Tsinghua University, LIAN SHEN, University of Minnesota — Axial flow pump is widely used in drainage, irrigation, and water diversion applications. A high-fidelity numerical method is needed to study the flow physics and accurately predict the pump performance. In the present work, the transient flow past an axial pump, comprised of the hub, casing, a rotating impeller and a stationary stator, is simulated by large-eddy simulation with the immersed boundary method using a code developed in-house, which is capable of accurately simulating the turbulent flow with three dimensional complex geometries with stationary and moving boundaries. The accuracy of the present simulation method is verified by comparing the predicted hydraulic performance of the pump with experimental results. Based on the simulation results, the internal flow field in the pump is analyzed by investigating velocity and pressure distributions, and turbulent flow structures. Further, pressure oscillation and hydraulic force in the pump are also predicted. The obtained information is helpful to improve the pump design for better performance.

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