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Numerical analysis on flow characteristics and performance of partial emission cryogenic liquid hydrogen pump with different impeller types

A partial emission cryogenic liquid hydrogen pump of radial-straight-blade was developed to meet an application requirement of small flow rate and high pump head. The exterior performance and flow characteristics of a partial emission cryogenic liquid hydrogen pump were simulated and studied in this paper. The external characteristic was predicted by using of sliding mesh method. The phenomenon of reverse and secondary flow was found in pump, in order to improve the internal flow, three kinds of impeller types were proposed. Based on the results, it can be concluded that the amount and extent of the vortex of backward inclined blade is fewer than radial-straight-blade. It was a good situation to improve inner flow that using the complex backward inclined blade (6+6). The prediction of external characteristics is accurately, by which the relative deviation of head was $\pm 5\%$.

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