Development of Rotating Stall with Hydrofoil Experiment

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Abstract: Rotating stall is considered to be a reason for several complex fluid dynamics phenomena such as positive-slope performance curve of reversible hydro-turbine, cavitation in pumps. Fluid flow over a NACA0009 hydrofoil in rectangle channel, which could be considered as an early stage research of stall of an axial pump, is investigated by experiments and computational fluid dynamics (CFD) numerical simulation is conducted with 2D NACA0009 hydrofoil. Situations with continuous incidence angles and cavitation numbers are studied. The flow field analysis led to a stall phenomenon is discussed in detail, which is performed in several stages, from its onset to development. Based on the discussion above, the factors affected to the generation of stall are also analyzed.
Key words: Rotating stall; Hydrofoil; Incidence angle