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LDA analysis of swirling flow in a hydro turbine draft tube

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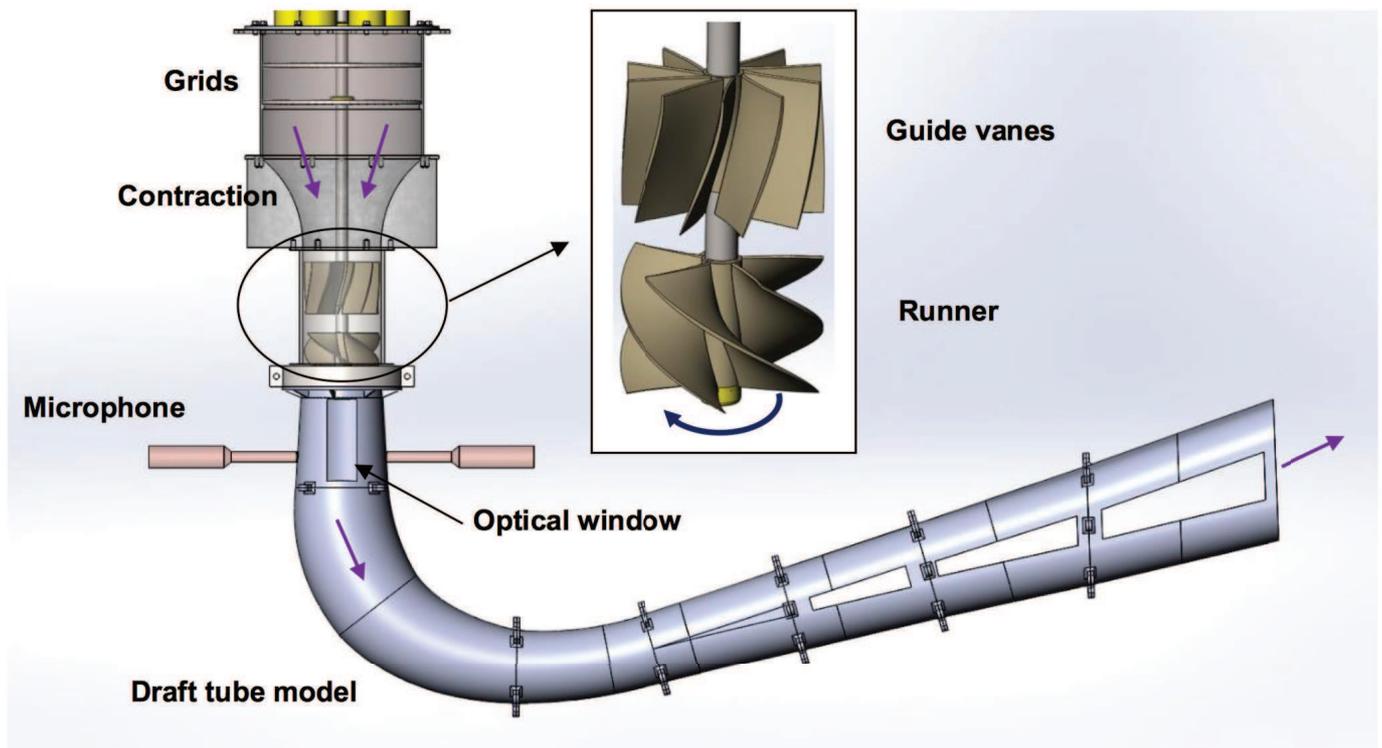
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ABSTRACT

The work reports on experimental study of flow and pressure pulsations in draft-tube of a laboratory air model of a Francis hydro-turbine operating over a broad range of regimes corresponding to different combinations of the runner rotation speed and flowrates. The velocity measurements using a computer-automated laser-Doppler anemometer and the pressure recording by wall-mounted acoustic sensors for a selection of operating conditions reveal different patterns of the swirling flow, with clearly identifiable regimes with the maximum flow pulsations at non-optimal operating conditions. The regimes with distinct precessing vortex cores show notable rearrangement of the velocity fields, accompanied by an increase in the amplitude of the pressure pulsations, as confirmed by the peaks of the spectra of pressure signals from wall-mounted microphones.



A view of test section.

