

عنوان مقاله:

Experimental Investigation on Flow Characteristics in a Turbine Rotor-Stator Cavity with Inlet at Low Radius

محل انتشار:

دوماهنامه مکانیک سیالات کاربردی، دوره 15، شماره 1 (سال: 1401)

تعداد صفحات اصل مقاله: 12

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خلاصه مقاله:

An experimental investigation has been designed and performed to determine the fluid flow characteristics in a rotor-stator cavity with large gap ratio and inlet at low radius. In this investigation, the particle image velocimetry (PIV) technique is employed for the velocity measurements of airflow in the rotor-stator cavity. Local swirl ratios are calculated from these velocity distributions. A range of parameter combinations of interest in fluid flow characteristics is covered, including combinations of variations in axial location, rotational Reynolds number (denoted as Re_ϕ), and inlet nondimensional mass flow rate (denoted as CW). The results indicate that the flow in the rotor-stator cavity is still dominated by circumferential motion. The velocity is basically unchanged along the circumference. However, the velocity increases with the increase of radial position. In different axial positions, the velocity distribution is different. The closer to the rotor, the more uneven the flow in the rotor-stator cavity is. The disturbance of the rotor rotating motion to the fluid mainly occurs in the high radius region, which should be paid more attention to in the process of reforming the flow field characteristics. To the circumferential velocity of low radius fluid, the Re_ϕ is in direct proportion, while the CW is in inverse. The swirl ratio in the core region is very close to that in the high radius near the wall region of the rotor, which can be inferred to be caused by the backflow in the rotor-stator cavity.

کلمات کلیدی:

Rotor-stator cavity, Rotational Reynolds number, Nondimensional mass flow rate, Swirl ratio, Particle image velocimetry

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