SEMINARIO

Área Departamental Aeronáutica
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Validación del Método Armónico en cálculos CFD no estacionarios de turbomáquinas

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RESUMEN

Because of the relative motion of adjacent blade rows, flows in turbomachinery applications are by nature unsteady; what can affect the machine performances. Wakes, shock waves, potential effect and gap vortex take part into these interaction phenomenons between successive blade rows. Unsteady simulations with computational fluid dynamics (CFD) allow to predict with accuracy the flow fluctuations. However, these approaches have very important CPU and memory costs, what makes difficult an utilization in industrial applications.

A new approach, so called the .harmonic method., allows a numerical frequential resolution of Navier stokes equations for unsteady cases. The main idea is that the flow perturbations that make the flow unsteady are written about a time-averaged value of the flow and are Fourier decomposed in time. Casting the unsteady Navier-Stokes system into the frequency domain, transport equations are obtained for each time frequency. The aim of this approach is to provide an approximate unsteady solution at affordable calculation costs. In this report comparisons are carried out between flow variables issued from numerical results and flow variables issued from experimental measurements in an axial turbine.

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