UNIVERSITÀ DEGLI STUDI FIRENZE
DIEF
DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

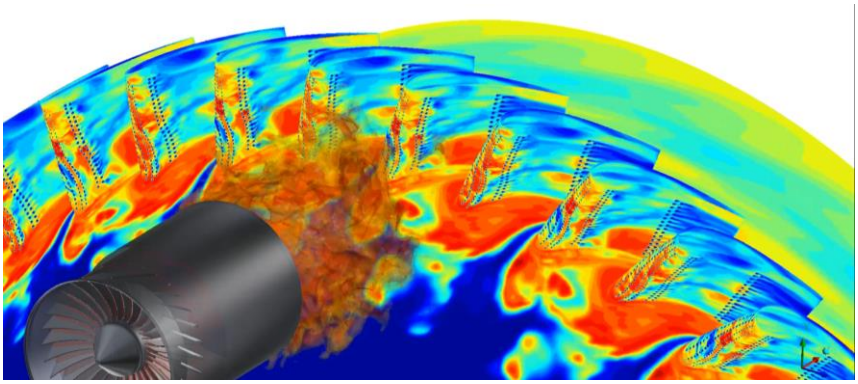
COMBUSTOR-TURBINE INTERACTIONS IN MODERN AERO-ENGINES: EXPERIMENTAL AND NUMERICAL STUDIES

DR. ANTONIO ANDREINI

Department of Industrial Engineering – DIEF
University of Florence
Italy

Abstract

The accurate definition of the fluid dynamic conditions at the exit of gas turbine combustors are of paramount importance in the aero-thermal design of the aero-engine. In fact, both the heat loads and the aerodynamic performance of the high pressure turbine (HPT) are substantially affected by the entry conditions, such as velocity components, temperature and turbulence intensity. The problem is particularly serious in new generation devices based on a lean burn concept. Compared to standard Rich–Quench–Lean (RQL) scheme, the absence of dilution jets and the use of highly swirled flows for flame stabilization make the control of combustor exit temperature distribution a complex task. Therefore, the high-fidelity prediction of the hot streak formation within the combustor, as well as its propagation through the HPT, are becoming key aspects.



This talk provides an overview of the research activities carried out at UNIFI in the frame of the EU funded program FACTOR to deepen the knowledge of the interaction between modern lean burn combustors and high pressure (HP) turbines. A nonreactive real scale annular tri-sector combustor simulator has been assembled with the goal of investigating and characterizing the combustor aerothermal field as well as the hot streak transport toward the HP vanes. Investigations have been carried by dedicated experiments and high fidelity CFD simulations.

Dr. Antonio Andreini
Via Santa Marta,3 – 50139 Firenze
Phone +39 055 2758770
e-mail: antonio.andreini@htc.unifi.it, e-mail: antonio.andreini@unifi.it
Mobile +39 349 8395752