

Title: Scientific challenges for the development of hybrid modeling / optimization and control strategies of complex fluid systems (chair PROVE Green Aeronautical Propulsion)

Authors: Denis Sipp (ONERA) and Angelo Iollo (MEMPHIS)

Abstract: Combining physical knowledge and data for designing accurate models to represent input-output or input-state-output relations raises several scientific challenges, especially when data is scarce. We will more specifically consider the following topics, which are also the scientific challenges of the chair PROVE: 1/ model correction with sparse measurements by expectation-maximisation, 2/ parametrized reduced-order modelling of state with registration methods, 3/ hybrid dynamical models for closed-loop control of bifurcations, 4/ data-based improvement of turbulent wall laws for CFD simulations, 5/ input-output models for robust optimization with reduction of the input space based on active subspaces. Each of these topics will be motivated by industrial needs and discussed in the light of existing literature. They also consist in an introduction to the posters presented by PhD students funded by the Chair PROVE, which is a collaboration between ONERA, MEMPHIS, CARDAMOM, PPRIME, SAFRAN HE, SAFRAN TECH, CEA CESTA and INGELIANCE.