S10 – Compressors and Fans

Organizers: Florent Ravelet & Kazutoyo Yamada

The compressors and fans are used in various industrial domains, from Aeronautics and Automotive industries to household applications. Their use, but also their manufacturing process, represents a significant energy consumption. The design of compressors and fans has evolved to get higher efficiencies, lower noise and extended ranges of efficient use, together with the increasing use of inverters and drive controllers. The different design parameters are becoming more numerous (skew/sweep, tandem machines, counter-rotating machines, ...). The interactions of these machines with their environment (for instance the heat exchanger in an automotive cooling fan system) and their influence on the performance and noise generation are more and more a constraint that must be taken into account from the very conception. The characterization of their transient behavior is also a key parameter for system modeling. Moreover, in the case of compressors, the occurrence of instabilities known as rotating stall and surge limits the operating range. Such unstable phenomena induce a considerable drop of performance in terms of pressure ratio, efficiency and mass flow, also leading to serious mechanical failures. Consequently, a surge margin is usually imposed to prevent the compressor operation from these situations. Both the increase of the stable operating range and the improvement of the surge margin are crucial and represent a real challenge for designers.

The **Compressors and Fans** Session of the ISROMAC 18 Conference is aimed at making a point on recent advances in design and characterization of compressors and fans, which includes:

(1) The various design methods and their coupling with optimization algorithms;

(2) Experimental and CFD studies dedicated to the characterization of unsteady and off-design behaviors;

(3) Passive or active control (blowing/suction, actuators and deformable materials).

Non-exhaustive list of suggested topics

- Design methods and coupling with optimization algorithm
- Passive or active control
- Technological improvements of surge margin

Organizers

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