



*Presentation title:*

“Flow instabilities in centrifugal compressors by Large Eddy Simulations”

By Dr. Mihai Mihaescu, Royal Institute of Technology (KTH)

*Abstract:*

When a centrifugal compressor operates at low mass flow rates (close to the unstable operating condition called surge), flow instabilities can develop and severe flow reversal may occur in the wheel passage.

The Large Eddy Simulation (LES) approach is employed to capture the developed flow instabilities, which are quantified by means of statistical averaging, Fourier data analysis, and flow mode decomposition techniques. Thus, the mode describing the low frequency pumping effect occurring with surge is exposed and quantified. Additionally, the compressor is characterized from aeroacoustics stand point of view, emphasizing the noise generation accompanying surge.

The flow predictions under unstable operating conditions are contrasted against data at design operating conditions. Available experimental data are used for validation purposes.

*Presenter's biosketch:* Dr. Mihaescu has received his PhD Degree from Lund University (Sweden) and completed his postdoctoral studies at the University of Cincinnati, Department of Aerospace Engineering and Engineering Mechanics, Gas Dynamics and Propulsion Laboratory, USA. Presently, he is Associate Professor of Fluid Mechanics at the Royal Institute of Technology (KTH) in Stockholm. Dr. Mihaescu has published more than 65 peer-reviewed publications, among which 25 in reputed international journals. His research strategy is based on advancing fundamental knowledge of fluid flow to provide physics-based guidance for the development of more efficient and environmentally friendly power generation and propulsion systems.

In addition to his academic appointment, Dr. Mihaescu is Vice-Director of the Competence Center for Gas-Exchange (CCGEx) at KTH and member of the American Society of Mechanical Engineers (ASME)'s Computational Fluid Dynamics and Fluid Mechanics Technical Committees.