

## **Invited Lecture**

# **Challenges and Opportunities in Turbomachinery Aeromechanics**

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Turbomachinery blades may be subject to flow-induced resonant vibration due to a variety of phenomena. Whereas there are phenomena that are synchronous to rotational speed such as forced response due to asymmetries or adjacent blade rows, there are other phenomena such as flutter or Non-Synchronous Vibrations (NSV) that are not directly related to rotor speed. Unless properly damped, all these phenomena may seriously harm the integrity of components and by this limit the availability of machines. By properly addressing potential problems early in the design stage, costly problems may be avoided later in service life. Nowadays, sophisticated numerical tools are available that allow engineers to analyze the relevant phenomena at a high level of detail. Such simulations involve an aerodynamic and a structural dynamics part and are usually rather challenging. This lecture will give brief introduction into the field of turbomachinery aeromechanics and current simulation and testing possibilities. Based on a few practical examples, challenges are discussed and opportunities are highlighted to give an idea of the potential of properly addressing such problems.