DISSEMINATION REPORT

Report Title: **Investigation of Effects of Aerodynamic Mistuning on Aerodamping in an Oscillating LPT Cascade – Part I: Direct Simulations of Influence Coefficients**

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Abstract:

Nowadays, the gas turbine design tends toward lighter, more powerful and at the same time more reliable engines. Also the blades tend to be lighter and longer which lead to a more aggressive conditions. The conditions aforementioned lead to a high risk of flutter generally with catastrophic consequences. The flutter phenomenon is a self-excited and self-sustained vibration of blades that occurs when the blade is absorbing energy from the flow, the amplitude increase and leads to blade failure. Therefore, the development of new and more efficient techniques in flutter analysis is a challenge for the engine design. There are several investigations about how an oscillating low pressure turbine cascade affects to the aerodamping, however from the aerodynamic point of view of the most of them assumes to be symmetric. In real life due to the manufacturing tolerances and assembly inaccuracies the structure is not perfectly symmetric. This phenomenon is called mistuning. The present work investigates the effects of aerodynamic mistuning on aerodamping in an oscillating low pressure turbine cascade. The investigation is conducted numerically using a commercial CFD solver, ANSYS CFX. The influence coefficient technique method is used for getting the aeroelastic response phenomenon, oscillating the center blades in different 3D rigid body modes. Thereby, the effects of the axial, circumferential and torsional modes are studied, as well as the influence of the different reduced frequencies and different Mach numbers. Aerodynamic mistuning affects positive and negative to the aerodamping.

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