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## DLR – DAAD Fellowships

Fellowship No. 382

**Research Area :** Aeronautics

**Research Topic:** **Efficient methods for the prediction of unsteady flows and aeroelastic response and stability in turbomachinery**

**DLR Institute:** Institute of Aeroelasticity Göttingen

**Position:** Senior Scientist

**Openings:** 1

**Job Specification:** The Aeroelastic Simulation department of the Institute of Aeroelasticity is seeking support to develop an efficient method for predicting unsteady flows in turbomachinery. This should reduce the computational effort of the aeroelastic analysis significantly. The technique should also be applicable to the design when looking for optimal multi-parameter configurations.

Currently, three main approaches are being followed to reduce aerodynamic model size and computational effort. It captures the flow non-linearities and preserves the accuracy associated with modern computational fluid dynamics (CFD) models:

- (i) Harmonic Balance,
- (ii) Volterra series and transmission functions and
- (iii) reduced-order models (ROM).

The recently developed POD-based ROMs (orthogonal decomposition method) reduce computational complexity by at least a few orders of magnitude compared to full-order models. The current challenge for turbomachinery flows is the high computational burden of using the full-scale model to generate the snapshots that the POD method requires for all inter-blade phase angles. Thus, a new method which combines full-order and reduced-order models to allow the generation of snapshots for each inter-blade phase angle is sought.

**Required Qualification:** Professorship in the field of propulsion, aeroelasticity, and computational fluid dynamics. Doctoral degree in Mechanical Engineering. Proved experience in computational fluid dynamic analyses for turbomachinery and in reduced-order modelling based on the proper orthogonal decomposition (POD).

**Advantageous Skills:** Experiences in the development of CFD codes and codes for high-fidelity aeroelastic analysis.

**English competence:** Proficient in spoken and written English or German.

**Earliest Start Date:** 17th of June

**Application Deadline:** Until the position is filled

**Further Information:** <http://www.dlr.de>  
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