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1. INTRODUCTION

The work deals with a numerical calculation of a flutter boundary. Within this scope the flutter boundary will first be calculated as a curve in Ω^2 which determines the threshold for the occurrence of the flutter instability depending on two variables, namely the flow velocity V and blade index i . The value of the Mach number is related to the flow conditions, while the mass ratio μ is related to the parameters of the structure. The flutter boundary could be used for assessing flutter occurrence in turbomachinery blades. Calculation of a flutter boundary seems to be a highly-structured problem (FSI) problem to be solved. The distributed Galerkin finite element method (DGFM) [1, 2] was used for the spatial discretization of fluid flow equations in arbitrary Lagrangian-Eulerian (ALE) form. The DGFM is typically the most rapidly developing method in the field of computational fluid dynamics. The primary regularity is mainly due to its ability to achieve high-order spatial accuracy for unstructured meshes and stability. The solution of fluid flow equations was performed using the semi-implicit level set method [3], which is a multipurpose numerical software developed by the authors of this contribution. Within this work only the rigid bodies, which motion are described by linear system of ordinary differential equations (ODEs), are considered as a model of structure. The structural equations for transient and steady state are solved using ODE and discretized by the explicit Runge-Kutta method. In this work the work domain approach is used for the solution of FSI problem.

The solution of FSI problem was tested on two test cases and compared with results from the state of the art. The flutter boundary for unsteady blade motion is calculated.