

Numerical simulations of flow induced vocal folds vibrations

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Abstract

In this paper the numerical method for solution of an aeroelastic model describing the interactions of air flow with vocal folds is described. The flow is modelled by the incompressible Navier-Stokes equations spatially discretized with the aid of the stabilized finite element method, [1]. The motion of the computational domain is treated with the aid of the Arbitrary Lagrangian Eulerian method. The structure dynamics is replaced by a mechanically equivalent system with the two degrees of freedom governed by a system of ordinary differential equations, see [2]. The structure model discretized in time with the aid of an implicit multistep method and strongly coupled with the flow model. The influence of inlet/outlet boundary conditions is studied and the attention is paid to the application of the physically correct boundary conditions in the case of closing of the channel. The numerical simulations are performed and compared to the related results.

Keywords: vocal fold, finite element method, aeroelasticity

References

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