

Title: Numerical modelling of vocal folds

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Abstract: I created a 2D model of vocal fold oscillations driven by interaction with fluid flow (FSI model). I used the theory of finite strains of the structure. The flow was modelled as a viscous incompressible fluid. The numerical problem was solved by the finite element method (FEM) with the arbitrary Lagrangian-Eulerian (ALE) method. The model shows the regime before phonation without the contact of the vocal folds and the states that directly lead to the contact of the vocal folds. I compared the time dependence of the quantities measured at sensors attached to the folds. I measured the frequency characteristics and compared the results with the modal analysis. Consequently, I calculated a parametric study of the dependence of the oscillations on the inlet air velocity, the original distance of the vocal folds and the elasticity of the vocal folds. The parametric study confirms that a sufficient increase of the inlet air velocity and a sufficient constriction of the *glottis* lead to the phonation onset. The parametric study also shows that changing elastic parameters has a similar effect on the spectrum for both the FSI model and the modal analysis.

Keywords: Vocal folds, finite strains, finite element method