The thesis addresses the numerical solution of the oscillation of the vocal fold at finite strain, whereas the literature has so far been concerned with infinitesimal strain only. The geometry concerned corresponds to the easiest situation of falsetto, since we observe an isolated vocal fold. The vocal fold is treated as non-linear and non-isotropic continuum in 2D space.

To demonstrate the function of the model, we simulate the behaviour of the vocal fold with the linear constitutive equation numerically. The vocal fold is modelled by the finite element method with quadratic elements for static and dynamic surface load. We show that a proper simulation of vocal fold tissue deformation requires the equations with finite strain term.

Numerical simulation of the vocal fold can be used e.g. for the construction of artificial vocal folds, and for the optimization of their function. Understanding the phonatory mechanism is also essential for discovering the causes of the disorders such as the vocal nodules and for the scientific foundation of phoniatrics and education of singers. The thesis is interdisciplinary and synthesises the facts from mechanics of continuum, anatomy and education of singers.