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Vocal Folds Simulations with Contact Algorithm JUBIAO YANG, LUCY ZHANG, Rensselaer Polytechnic Institute — Our modified IFEM numerical algorithm was able to simulate vocal folds vibration, and demonstrates relations among vibration frequencies and several fluid and solid parameters successfully. However, although interactions between the solid, i.e. the vocal folds, and the fluid, i.e. air, are well handled, contacts and forces between solid parts, namely vocal folds, have been neglected based on the assumption that their influence is very limited, which may not hold true. To more accurately predict motion and deformation of the vocal folds, and to evaluate its effects on airflow, a contact algorithm is implemented to model when the glottis is completely shut off. The algorithm is developed to decide whether solid parts have made contact, to calculate the interaction force in between, and to decide when they again set apart. This contact algorithm correctly models the interaction between the vocal folds instead of neglecting the unrealistic overlapping of two solid parts, and shows the deformation of vocal folds caused both by the airflow and by the impact with each other. Our result capture the accurate vocal folds behaviors when two vocal folds are approaching each other in full-space cases, and when a vocal fold is approaching the symmetry-line wall in half-space cases.

Jubiao Yang
Rensselaer Polytechnic Institute

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