UNIFIED CONTINUUM FLUID-STRUCTURE INTERACTION (FSI) FOR VOICE MODELLING

Niyazi Cem Degirmenci[1] , Johan Jansson[2] ,Johan Hoffman[3], Stefan Becker[4] and Stefan Kniesburges[5]

[1] HPCViz/CSC/KTH, S-100 44 Stockholm Sweden, ncde@kth.se, http://www.csc.kth.se/~ncde/
[2] BCAM, Mazarredo, 14. 48009 Bilbao Basque Country Spain, jjansson@bcamath.org
http://www.bcamath.org/es/people/jjansson
[3] HPCViz/CSC/KTH, S-100 44 Stockholm Sweden, jhoffman@csc.kth.se
http://www.csc.kth.se/~jhoffman
[4] FAU, Cauerstrasse 4, 91058 Erlangen, sb@ipat.uni-erlangen.de
[5] FAU, Cauerstrasse 4, 91058 Erlangen, kn@ipat.uni-erlangen.de

Key Words: *Fluid-structure interaction, Voice Modelling.*

We present a monolithic approach for FSI simulation of human vocal folds. Uncertainty exists in the modelling of the biological tissues, not only due to patient anatomy but also due to difficulties in measuring constitutive parameters, since they differ in living and dead tissues.

Therefore we validate the model by testing against flow field data from experiments using replicas with known properties. The flow field is obtained through particle-image
velocimetry technique provided by collaborators from FAU- Erlangen.

We present the monolithic FSI model and the numerical method, based on the Unified Continuum methodology introduced in [1] and we make detailed comparisons between experiments and computational simulations.

REFERENCES

[1] J. Hoffman, J. Jansson, and M. Stöckli. Unified continuum modeling of fluid-structure interaction. *Mathematical Models and Methods in Applied Sciences*, 2011.