

- **NUM-04-003-IP**

### **Modelling Dynamical Effects of-Local morphological Changes of Vocal Folds**

*Juergen Neubauer, Tecumseh Fitch and Hanspeter Herzel*  
*Institute for Theoretical Biology, Humboldt University Berlin*  
*Invalidenstrasse 43, 10115 Berlin, Germany*  
*Phone=++49/30-20938496*  
*Fax=++49/30-20938801*  
[email=j.neubauer@biologie.hu-berlin.de](mailto:j.neubauer@biologie.hu-berlin.de)

We study the dynamical effects of local morphological changes of the vocal folds found in many vocal fold pathologies. Such morphological changes resemble naturally occurring variations in non-human mammals, termed vocal membranes. We use an extensively studied two-mass model adding thin light rigid upward extensions to the upper masses connected by a hinge, that incorporates elastic restoring forces and viscous damping. We study the effect of these vocal membranes on the phonation onset, on the capability of high-frequency vibrations of the two-mass model, and on the production of irregular and chaotic vibration of the whole extended model.