



**Supervisor's statement on the doctoral thesis:  
Biomechanics and acoustics of voice production by Hugo Lehoux, M.Sc.**

Hugo Lehoux, M.Sc. has prepared his thesis devoted to biomechanics and acoustics of voice production. Voice production involves complex biomechanical and acoustical events that have not been understood in detail. Their understanding is important for multiple purposes, such as better diagnosis, treatment and prevention of voice disorders, designing better methods of voice rehabilitation and therapy, improvements in singing voice pedagogy, creating models for human-machine interactions, e.t.c.

The thesis is based on four original papers published in impacted journals that reflect the work of Hugo Lehoux during his doctoral studies at the Palacký University in Olomouc. The first paper deals with the development of an anechoic subglottal tract. It is a continuation of the work of a previous doctoral student in biophysics at the Faculty of Science, Palacký University in Olomouc – Mgr. Vít Hampala, Ph.D.. Hugo Lehoux has managed to complete the work and showed that the anechoic tract successfully suppresses its acoustic resonances and thus allows to study the inherent oscillatory properties of the vocal folds without any interactions with acoustic resonances of the surrounding tracts.

The second paper explores this anechoic tract to study nonlinear-dynamic phenomena in human voice, particularly the pitch jumps, which are related to the highly controversial theme of voice registers. It shows, for the first time, that the vocal fold interactions with acoustic resonance cavities are not crucial for the pitch jumps to occur.

The third paper studies the voice registers further in a professional singer using high-speed laryngeal videoendoscopy, electroglottography and acoustic analysis in vivo and shows that the most sensitive parameter to distinguish vocal fold oscillations in chest and head registers is the maximum closing speed.

The fourth paper is a continuation of previous efforts in developing a simple kinematic model of the vocal fold oscillations that is capable of simulating realistically-looking kymograms and high-speed laryngeal videos.

The thesis has been prepared in accordance with the requirements of the Faculty of Sciences, Palacký University in Olomouc. I confirm that three of these papers were written by Hugo Lehoux, M.Sc. as the main author. He contributed to the fourth paper as a co-author. I am satisfied with the thesis and I recommend it for defense.

In Olomouc, May 29, 2023

  
doc. RNDr. Jan Švec, Ph.D. et Ph.D.