

Abstract Submitted  
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**The effect of vocal fold vertical stiffness gradient on sound production** BIAO GENG, QIAN XUE, XUDONG ZHENG, University of Maine — It is observed in some experimental studies on canine vocal folds (VFs) that the inferior aspect of the vocal fold (VF) is much stiffer than the superior aspect under relatively large strain. Such vertical difference is supposed to promote the convergent-divergent shape during VF vibration and consequently facilitate the production of sound. In this study, we investigate the effect of vertical variation of VF stiffness on sound production using a numerical model. The vertical variation of stiffness is produced by linearly increasing the Young's modulus and shear modulus from the superior to inferior aspects in the cover layer, and its effect on phonation is examined in terms of aerodynamic and acoustic quantities such as flow rate, open quotient, skewness of flow wave form, sound intensity and vocal efficiency. The flow-induced vibration of the VF is solved with a finite element solver coupled with 1D Bernoulli equation, which is further coupled with a digital waveguide model. This study is designed to find out whether it's beneficial to artificially induce the vertical stiffness gradient by certain implanting material in VF restoring surgery, and if it is beneficial, what gradient is the most favorable.

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