**Proceedings of the Canadian Society for Mechanical Engineering International Congress**
**32nd Annual Conference of the Computational Fluid Dynamics Society of Canada**
**Canadian Society of Rheology Symposium**
**CSME-CFDSC-CSR 2025**
**May 25–28, 2025, Montréal, Québec, Canada**

# Rayleigh-Lamb Wave Propagation in a Finitely Deformed Viscoelastic Dielectric Elastomer (DE) Layer

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ABSTRACT

In recent decades, dielectric elastomers (DEs) have received substantial research interest for dynamics applications as waveguide, which offers an alternative to actively manipulate wave propagation by applying an electric field to the DE medium. However, predicting wave propagation behavior in DE medium is very challenging due to the delicate interplay among electromechanical coupling, finite deformation and material viscoelasticity. This work aims to tackle this issue by studying the Rayleigh-Lamb wave propagation in a viscoelastic DE medium based on the finite-deformation viscoelasticity theory. Simulation results have demonstrated the effects of material viscosity, electrical load, and mechanical pre-stretch on the wave dispersion behavior. It is concluded that material viscosity causes significant changes in the wave dispersion, and waves with certain frequencies could be actively filtered by the application of electrical load. This work is expected to better understand the fundamentals of wave propagation in DE media and trigger more innovative design of DE waveguide.