

State-Space Modelling of Loudspeakers using Fractional Derivatives - DTU Orbit (08/11/2017)

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This work investigates the use of fractional order derivatives in modeling moving-coil loudspeakers. A fractional order state-space solution is developed, leading the way towards incorporating nonlinearities into a fractional order system. The method is used to calculate the response of a fractional harmonic oscillator, representing the mechanical part of a loudspeaker, showing the effect of the fractional derivative and its relationship to viscoelasticity. Finally, a loudspeaker model with a fractional order viscoelastic suspension and fractional order voice coil is fit to measurement data. It is shown that the identified parameters can be used in a linear fractional order state-space model to simulate the loudspeakers' time domain response

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Authors: King, A. W. (Intern), Agerkvist, F. T. (Intern)

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