



On the Dynamics of Axially Moving Strings

By Ulrike Zwierns

Cuvillier Verlag Aug 2007, 2007. Taschenbuch. Book Condition: Neu. 211x147x9 mm. Neuware - The primary objective of this thesis is to provide a coherent and concise elaboration of the modeling and analysis of axially moving strings. Both analytical and numerical solution techniques are used to study the free vibrations of strings in stationary and accelerated motion. Axially moving continua are prevalent in many engineering applications such as power transmission belts, magnetic tapes, elevator and crane hoist cables, band saw blades, and textile-fiber manufacture. During the past several decades, those systems have been extensively studied by many researchers, frequently referring to the translating uniform string as the simplest representative of distributed gyroscopic systems. This thesis addresses the modeling and analysis of strings moving axially between fixed supports. First, the problem of stationary motion is defined, and it is demonstrated that a perfectly flexible string can undergo a snake-like motion, that is, a motion along an arbitrary fixed path in space, only at constant speed. Along a straight line, however, motion at time-varying speed is feasible. For this special case, the linearized equation governing the transverse vibrations of an axially accelerated string is derived in both Lagrangian and Eulerian description by superposing...



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