

Mathematical analysis of a contact problem for a non-clamped nonlinear viscoelastic rod.

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We investigate the dynamic behavior of a nonlinear viscoelastic rod in contact with a deformable foundation along its length and with a reactive obstacle at one end. The rod is subjected to body forces that govern its mechanical response over time.

We establish the existence of a weak solution to the resulting contact problem. The proof relies on a time discretization scheme for second-order differential inclusions involving multivalued pseudomonotone operators.

The model extends that proposed in [1] by removing the homogeneous Dirichlet boundary condition at the left end of the rod. This modification allows for a more general mechanical setting in which the rod is not clamped. At the same time, the principal operator is no longer coercive, which substantially increases the analytical difficulty of the problem. We overcome this issue and prove the existence of a weak solution under the reasonable assumptions.

References

- [1] K. Bartosz, M. Sofonea *Modeling and analysis of a contact problem for a viscoelastic rod*, Z. Angew. Math. Phys. 67:127, (2016)

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