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ON AN INVERSE PROBLEM FOR A MODEL OF LINEAR VISCOELASTIC KIRCHHOFF PLATE

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ABSTRACT. A linear viscoelastic Kirchhoff plate model with a rotational inertia term is considered. In this model, the vertical deflection u of a viscoelastic plate is governed by a linear integrodifferential evolution equation which contains a time convolution term. The convolution kernel, D, named viscoelastic flexural rigidity, is supposed to depend on time only. Provided that u is a solution to a suitable initial and boundary value problem for the motion equation, the inverse problem of determining D from supplementary information is analyzed. Three possible additional measurements and the corresponding inverse problems are examined. The main theorems are concerned with existence of solutions on a given bounded time interval. Continuous dependence on data is also discussed. These results extend the ones contained in a previous authors' paper.

1. Introduction. Consider a homogeneous and isotropic plate of uniform thickness $h > 0$ which occupies, for any $t \in [0,T]$, $T > 0$, a domain $\Omega \times (-h/2, h/2) \subset \mathbf{R}^3$, where Ω is an open, connected, and bounded subset of $\mathbf{R}^2$ with a smooth boundary Γ. Denote by $u(x,t)$ the vertical deflection of the plate from its equilibrium position $u \equiv 0$, at point $x \in \Omega$, at time $t \in [0,T]$. Assume that the plate is made from a viscoelastic material and lies free of stresses and strains up to the initial time $t = 0$. Besides, suppose that the mass density is equal to 1, just for the sake of simplicity. Then, neglecting thermal effects, using the stress-strain relationship characterizing the three-dimensional linear viscoelasticity of Boltzmann type (see, e.g., [**5, 8**] and references therein) and imposing the *Kirchhoff hypothesis*, it can be shown that the evolution of u is ruled by (cf. [**9**, Chapter I, Section 7], [**10**] and [**11**, Chapter 2, Section 1.4 and Chapter 6], see also [**15**] and its references

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