OPTIMAL INDIRECT STABILITY OF A WEAKLY DAMPED ELASTIC ABSTRACT SYSTEM OF SECOND ORDER EQUATIONS COUPLED BY VELOCITIES

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Abstract. In this work, by means of the Riesz basis approach, we study the stability of a weakly damped system of two second order evolution equations coupled through the velocities. This system takes the following form

$$u_{tt} + aAu + A^{\gamma}u_t + \alpha y_t = 0,$$
$$y_{tt} + Ay + \alpha u_t = 0,$$

where α is non zero real number, $a > 0, \gamma \leq 0$ and A is a self-adjoint coercive operator in a separable Hilbert space H. If the fractional order damping becomes viscous and the waves propagate with equal speeds, we prove exponential stability of the system and, otherwise, we establish an optimal polynomial decay rate. Finally, we provide some illustrative examples.

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