Regularity of the semigroup associated with some interacting elastic systems

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SUMMARY

In this talk, we explore the regularity and stability of two damped abstract elastic systems with degenerate damping mechanisms [1, 2]. The damping involves average velocity and a fractional power θ of the principal operator, with θ ranging from -1 to 1. Key findings include:

- For θ in $(\frac{1}{2}, 1]$, the semigroup is not analytic, though it is differentiable for θ in $(0, 1)$. This contrasts with single damped elastic systems where the semigroup is analytic for θ in $[\frac{1}{2}, 1]$.

- For θ in $(0, \frac{1}{2}]$, the semigroup belongs to certain Gevrey classes.

- The semigroup decays exponentially for θ in $[0, 1]$ and polynomially for θ in $[-1, 0)$.

The frequency domain method, based on resolvent estimates, is used to prove these results, and the optimality of the resolvent estimates is established. Two application examples are also provided.

Keywords: Regularity, Stability, Semigroup, Interacting elastic systems.

AMS Classification: 47D06, 35B40.

References

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