

Global attractors for 2-D Kirchoff-Boussinesque evolutions

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Abstrakt

Dynamics for a class of nonlinear 2D Kirchhoff-Boussinesq models will be considered. These nonlinear plate models are characterized by a presence of a nonlinear source that alone leads to finite-time blow up of solutions. In order to counteract, restorative forces are introduced, which however are of a supercritical nature. This raises natural problems related to existence and wellposedness of weak solutions.

It is shown that finite energy solutions do exist globally and the corresponding flow generates a nonlinear semigroup. The proof is based on logarithmic control of the lack of Sobolev's embedding along with appropriate "negative norm estimates" [3].

In addition to wellposedness, long time behavior is analyzed. It is shown that there exists global attractor corresponding to both weak and strong solutions. The dimension of the said attractor is finite and it displays C^∞ smoothness. Thus, the long time dynamics of a supercritically forced hyperbolic -like flow is shown to enjoy finite dimensional and smooth structures.

These results are obtained by exploiting recently introduced abstract theory for attractiveness [1] along with the method introduced in [2].

Literatura

- [1] J. Ball, *Global attractors for semilinear wave equations*, Discr. Cont. Dyn. Sys. **10**, 31-52 (2004)
- [2] I. Chueshov and I. Lasiecka, *Long-time behavior of second order evolution equations with nonlinear damping*, Memoirs of AMS, vol.195, no. 912, AMS, Providence, RI, 2008
- [3] I. Chueshov and I. Lasiecka, *On Global attractor for 2D Kirchoff-Boussinesq model with supercritical nonlinearity*, Communications on PDE's, to appear 2010.