Classification of asymptotic profiles for the Cauchy problem of damped beam equation with two variable coefficients

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We study a one-dimensional linear damped beam equation with two variable coefficients:

$$u_{tt} + u_{xxxx} - b(t,x)u_t - (a(t,x)u_x)_x = 0, \qquad t > 0, \quad x \in \mathbb{R}$$

From the physical point of view the equation arises from linearized equation of e.g. the Woinowsky-Krieger equation describing extensible beam (see [1,2]). From the mathematical viewpoint, it corresponds to linearized Kirchhoff equation with 4th order space-derivative term. Our aim of this study is to classify the property of solutions by the decay rate of given variable coefficients with respect to time. The talk is based on collaborations with Yuta Wakasugi (Ehime University).

[1] Reinhard Racke and Shuji Yoshikawa, *Decay estimates for the Cauchy problem for the damped extensible beam equation*, Applicable Analysis, **95** (2016), 1118–1136.

[2] Reinhard Racke and Shuji Yoshikawa, *Singular limits in the Cauchy problem for the damped extensible beam equation*, J. Differential Equations, **259** (2015), 1297–1322.

[3] Shuji Yoshikawa and Yuta Wakasugi, *Asymptotic profile of solution for the Cauchy problem of beam equation with variable coefficient*, Appl. Math. Lett., **76** (2018), 236–241.