SMOOTH DYNAMICS OF A NEW BRESSE-FOURIER SYSTEM: A SEMIGROUP APPROACH

Abstract. The Bresse system is a mathematical model for circular beams that features shear force, bending moment and axial displacements. Motivated by physical modeling concerning this problem, we consider a thermoelastic Bresse beam where thermal effects satisfy Fourier Law and acts independently on above three features.
In this talk, we study the thermoelastic system with Dirichlet boundary condition, and prove that the thermal dissipation can drives the system exponentially to zero without adding special assumptions on the system's coefficients, through the Gearhart-Prüss characterization. To this end, because the difficulties coming from the boundary condition, we shall provide a suitable observability inequality.
Another results such as existence of an global attractor also be discussed in below.

$$
\begin{aligned}
\rho_1\varphi_{tt} - k(\varphi_x + \psi + \ell w)_x - k_0\ell(w_x - \ell\varphi) + m_1\theta^1_x + \ell m_2\theta^2 &= 0,\\
\rho_2\psi_{tt} - b\psi_{xx} + k(\varphi_x + \psi + \ell w) + m_3\theta^3_x - m_1\theta^1 &= 0,\\
\rho_1 w_{tt} - k_0(w_x - \ell\varphi)_x + k\ell(\varphi_x + \psi + \ell w) + m_2\theta^2_x - \ell m_1\theta^1 &= 0,\\
\sigma_1\theta^1_t - \gamma_1\theta^1_{xx} + m_1(\varphi_x + \psi + \ell w)_t &= 0,\\
\sigma_2\theta^2_t - \gamma_2\theta^2_{xx} + m_2(w_x - \ell\varphi)_t &= 0,\\
\sigma_3\theta^3_t - \gamma_3\theta^3_{xx} + m_3(\psi_x)_t &= 0,
\end{aligned}
\tag{1}
$$

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References.

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