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DAMPED BRESSE SYSTEM WITH INFINITE MEMORIES

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Abstract. In this paper, we consider a one-dimensional Bresse system with infinite memories acting in the three equations of the system alternatively with frictional dampings. We establish well-posedness and asymptotic stability results for the system under some conditions imposed into the relaxation functions regardless to the speeds of wave propagation.

Keywords. Well-posedness, Uniform decay, Infinite memory, Bresse system, Frictional damping.

AMS (MOS) subject classification: 35B40, 35L45, 74H40, 93D20, 93D15.

1 Introduction

In this work, we will study the Bresse system with infinite memories acting in the three equations alternatively with frictional dampings. So, our system with the initial-boundary conditions takes the form

$$
\begin{cases}
\rho_1\varphi_{tt} - k_1\left(\varphi_x + \psi + lw\right)_x - lk_3\left(w_x - l\varphi\right) \\
\qquad\qquad\qquad + \alpha_1 \int_0^{+\infty} g_1(s)\varphi_{xx}\left(x, t-s\right) ds + \beta_1\varphi_t = 0, \\
\rho_2\psi_{tt} - k_2\psi_{xx} + k_1\left(\varphi_x + \psi + lw\right) \\
\qquad\qquad\qquad + \alpha_2 \int_0^{+\infty} g_2(s)\psi_{xx}\left(x, t-s\right) ds + \beta_2\psi_t = 0, \\
\rho_1 w_{tt} - k_3\left(w_x - l\varphi\right)_x + lk_1\left(\varphi_x + \psi + lw\right) \\
\qquad\qquad\qquad + \alpha_3 \int_0^{+\infty} g_3(s) w_{xx}\left(x, t-s\right) ds + \beta_3 w_t = 0, \\
\\
\varphi\left(0,t\right) = \psi\left(0,t\right) = w\left(0,t\right) = \varphi\left(L,t\right) = \psi\left(L,t\right) = w\left(L,t\right) = 0, \\
\\
\varphi\left(x,-t\right) = \varphi_0(x,t), \varphi_t\left(x,0\right) = \varphi_1(x), \\
\psi\left(x,-t\right) = \psi_0(x,t), \psi_t\left(x,0\right) = \psi_1(x), \\
\psi\left(x,-t\right) = \psi_0(x,t), \psi_t\left(x,0\right) = \psi_1(x), \\
w\left(x,-t\right) = w_0(x,t), w_t\left(x,0\right) = w_1(x),
\end{cases}
\tag{P}
$$