SEMINÁRIOS DO DEPARTAMENTO DE COMPUTAÇÃO E MATEMÁTICA (DCM)
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Decay Rates of Solutions for the Magneto-thermo-elastic System in $\mathbb{R}^3$.

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RESUMO

In our discussion we consider the following evolution system describing an magneto-thermo-elastic phenomenon in $\mathbb{R}^3$:

$$\begin{aligned}
&u_{tt} + \mathscr{L}(u) + \alpha\, u_t + \gamma \nabla\theta = \operatorname{curl} h \times H,\\
&h_t + \nu_1 \operatorname{curl}\operatorname{curl} h = \operatorname{curl}(u_t \times H),\\
&\theta_t - \kappa\Delta\theta + \gamma \operatorname{div} u_t = 0,\\
&\operatorname{div} h = 0,\\
&u(0,x) = u_0(x), \qquad u_t(0,x) = u_1(x),\\
&h(0,x) = h_0(x), \qquad \theta(0,x) = \theta_0(x),
\end{aligned} \tag{0.1}$$

for all $(t,x) \in \mathbb{R}^+ \times \mathbb{R}^3$, where $\mathscr{L}(u) = -\mu\Delta u - (\lambda+\mu)\nabla \operatorname{div} u$ with positive constants λ, μ. In the above system we denote by $u = (u_1, u_2, u_3)$ the displacement vector, $h = (h_1, h_2, h_3)$ the magnetic induction and θ is the temperature difference with respect to a fixed reference temperature. The coupling constants μ_0 (magnetic permeability) and γ are positive and $H = (0,0,1) = \mathbf{e}_3$ denotes the constant external magnetic field. The remaining constant ν_1 is defined as $1/(\sigma\mu_0)$, where $\sigma > 0$ is the conductivity of the material. In this work we study the asymptotic behavior of solutions for to problem (1). We improve results on decay rates considering weaker regularity on the initial data when compared to previous works in the literature. We also improve the method developed in [1], extending it for this coupled system of mixed hyperbolic-parabolic partial differential equations.