FRACTIONAL APPROXIMATIONS OF THERMOELASTIC PLATE SYSTEMS

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Abstract

Let Ω be a bounded domain in $\mathbb{R}^N$ with $N \geq 2$, which boundary $\partial\Omega$ is assumed to be a C^4 -hypersurface. In this paper we consider the initial-boundary value problem associated with the following thermoelastic plate system
$$\begin{cases} \partial_t^2 u + \Delta^2 u + \Delta \theta = f(u), & x \in \Omega, t > 0, \\ \partial_t \theta - \Delta \theta - \Delta \partial_t u = 0, & x \in \Omega, t > 0, \end{cases}$$
 subject to boundary conditions
$$\begin{cases} u = \Delta u = 0, & x \in \partial\Omega, t > 0, \\ \theta = 0, & x \in \partial\Omega, t > 0, \end{cases}$$
 and initial conditions
$$u(x, 0) = u_0(x), \partial_t u(x, 0) = v_0(x) \text{ and } \theta(x, 0) = \theta_0(x), x \in \Omega.$$
 We calculate explicit the fractional powers of the thermoelastic plate operator associated with this system via Balakrishnan integral formula and we present a fractional approximated system. We obtain a result of local well-posedness of the thermoelastic plate system and of its fractional approximations via geometric theory of semilinear parabolic systems.

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