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Fractional oscillon equations; solvability and connection with classical oscillon equations.

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Summary: In this paper we are concerned with the asymptotic behavior of nonautonomous fractional approximations of oscillon equation

$$u_{tt} - \mu(t)\Delta u + \omega(t)u_t = f(u),\ x \in \Omega,\ t \in \mathbb{R},$$

subject to Dirichlet boundary condition on $\partial\Omega$, where Ω is a bounded smooth domain in $\mathbb{R}^N$, $N \geq 3$, the function ω is a time-dependent damping, μ is a time-dependent squared speed of propagation, and f is a nonlinear functional. Under structural assumptions on ω and μ we establish the existence of time-dependent attractor for the fractional models in the sense of *A. N. Carvalho* et al. [Attractors for infinite-dimensional non-autonomous dynamical systems. Berlin: Springer (2013; Zbl 1263.37002)], and *F. Di Plinio* et al. [Discrete Contin. Dyn. Syst. 29, No. 1, 141–167 (2011; Zbl 1223.37100)].

MSC:

35B40 Asymptotic behavior of solutions to PDEs
35B41 Attractors
34A08 Fractional ordinary differential equations
35L20 Initial-boundary value problems for second-order hyperbolic equations
35L71 Second-order semilinear hyperbolic equations
35R11 Fractional partial differential equations
47D06 One-parameter semigroups and linear evolution equations

Keywords:

oscillon equation; fractional powers; fractional equations; semilinear hyperbolic equations; pullback attractor

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