Gorenflo, R.; **Mainardi, F.**

Fractional oscillations and Mittag-Leffler functions. (English) Zbl 0916.34011

Hamoui, Adnan (ed.) et al., International workshop on the recent advances in applied mathematics, RAAM '96, State of Kuwait, Kuwait, May 4–7, 1996. Kuwait: Kuwait Univ., Department of Mathematics and Computer Science, 193-208 (1996).

Summary: The fractional oscillation equation is obtained from the classical equation for linear oscillations by replacing the second-order time derivative by a fractional derivative of order α with $1 < \alpha < 2$. Using the Laplace transform, it is shown that the fundamental solutions can be expressed in terms of Mittag-Leffler functions, and exhibit a finite number of damped oscillations with an algebraic decay. For completeness the authors discuss both the cases $0 < \alpha < 1$ (fractional relaxation) and $2 < \alpha \leq 3$ (growing oscillations), showing the key role of the Mittag-Leffler functions.

For the entire collection see [Zbl 0879.00037].

Reviewer: Reviewer (Berlin)

MSC:

34A25	Analytical theory of ordinary differential equations: series, transformations, transforms, operational calculus, etc.
26A33	Fractional derivatives and integrals
33E20	Other functions defined by series and integrals
33E30	Other functions coming from differential, difference and integral equations
45E10	Integral equations of the convolution type (Abel, Picard, Toeplitz and Wiener-Hopf type)
45J05	Integro-ordinary differential equations
70J35	Forced motions in linear vibration theory

Keywords:

linear oscillations; Mittag-Leffler functions