VISUALIZATION IN TEACHING MATH. MODELLING

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Ordinary differential equations of the form $x'' + f(x)x' + g(x) = 0$ (i) often appear in mathematical modelling. The van der Pol oscillator $x'' - \mu\,(1 - x^2)\,x' + x = 0$, for example, describes stable oscillations in electrical circuits employing vacuum tubes. A simple harmonic oscillator $x'' + \omega^2 x = 0$ and damped oscillator $x'' + 2\delta\,x' + \omega^2 x = 0$ serve as mathematical models of various motions. We focuse on nonlinear oscillators describing by equations of the form (i) or similar and provide visual description of the behavior of solutions. Special attention is paid to nonlinearities in the form $g(x) = A(x - a_1)(x - a_2)\ldots(x - a_{2n-1})$. Emphasis is made on problems which may serve as objects of scientific research.