Isochronous systems are not rare

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May 17, 2007

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A dynamical system is called isochronous if it features an open (hence fully dimensional) region in its phase space in which all its solutions are completely periodic (i. e., periodic in all degrees of freedom) with the same fixed period (independent of the initial data, provided they are inside the isochronicity region). A trick is presented associating to an (autonomous) dynamical system an (also autonomous) modified system depending on a real parameter so that when this parameter vanishes the original system is reproduced while when this parameter does not vanish the modified system is isochronous. This technique is applicable to large classes of dynamical systems, justifying the title of this talk. Analogous techniques, even more widely applicable – for instance, to any translation-invariant (classical) many-body problem – transform a Hamiltonian system into an isochronous Hamiltonian system. Examples and (Diophantine) findings arrived at in this manner will be presented. These techniques can also be applied to PDEs - but there will be no time to explore this extension.