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An Aproach to Worm-Like Motion

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Observing the locomotion of worms one recognizes a conversion of (mostly periodic) internally driven motions into change of external position (undulatory locomotion). In this paper motion of a system of two material points x_1 and x_2 with the masses m, connected by a spring of stiffness c along an axis x is considered. It is supposed that the points are under the action of a small non-symmetric Coulomb dry frictional force $\varepsilon m F(\dot{x})$, $\varepsilon \ll 1$, depending on velocities $\dot{x} = \dot{x}_i$ $(i = 1,2)$, where $F(\dot{x}) = F_+$ if $\dot{x} > 0$, $F(\dot{x}) = F_-$ if $\dot{x} < 0$; $-F_- \geq F_+ \geq 0$. Excitation is carried out by the action of small internal periodic force. Investigations show: at presence of excitation and non-symmetric Coulomb dry friction a motion of the system with a constant on the average velocity $V > 0$ is possible and this motion is stable. The expression for V is obtained. A worm prototype applying the principles outlined above has been constructed.

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