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A New Road to Chaos in Dynamical Systems with Impact Interactions

Sergey P. Gorbikov, **Alevtina V. Menshenina**

Nizhny Novgorod State University of Architecture and Civil Engineering, Department of Higher Mathematics, Nizhny Novgorod, Russia

In this report a new road to chaos in dynamical systems with impact interactions is investigated. This road to chaos is connected with the bifurcation of the periodic motion. The bifurcation occurs when the periodic motion comes to the boundary of the region of infinite-impact motions existence (i.e. motions with infinitely many impact interactions in a finite time interval). It is shown how Smale's horseshoes can emerge in dynamical systems with impact interactions as a consequence of the bifurcation. Existence of Smale's horseshoe generates motions which are described by symbolic sequences of two characters. It results in chaotic behavior of the motions. A model of vibroimpact device is considered as an example. Different Smale's horseshoes and chaotic motions are numerically observed after the bifurcation. There are determined parameters values when stationary motions of the system are chaotic and have unusual limiting sets.

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