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# Beam-like and shell-like nonlinear normal modes interaction of single-walled carbon nanotubes

**Leonid Manevitch, Valery Smirnov**

*Abstract*: In the framework of the linear theory, NNMs in the bulk are independent, and therefore, no interactions between them can exist. In order to reveal the mode interaction and the effects, which can arise as its results, we need in the transition to the nonlinear vibration theory. We consider the CNT oscillations in the framework of the nonlinear Sanders-Koiter theory (Amabili 2008). We demonstrate that the effective reduction in the equations of motion in the combination with the asymptotic analysis allows to study the nonlinear mode coupling and to reveal new stationary oscillations, which are absent in the framework of the linear approach, as well as to describe the non-stationary dynamics under condition of the 1:1 resonance. This work was supported by Russian Science Foundation according to the research project no. 16-13-10302

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[1)] Leonid Manevitch, Professor: Semenov Instute of Chemichal Physics Russian Academy of Sciences, 119991 Moscow, Kosygin st, 4, Russia (RU), manevitchleonid3@gmail.com, the author presented this contribution at the conference in the special session "Perturbative model order reduction in dynamics" organized by I.A. Andrianov and V.V. Danishevskyy.

[2)] Valery Smirnov, Ph.D.: Semenov Instute of Chemichal Physics Russian Academy of Sciences, 119991 Moscow, Kosygin st, 4, Russia (RU), smirnovvv@gmail.com.