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V.B. Glavardanov, R.B. Margetic, M.M. Zigic, N.M. Grahovac

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## Secondary bifurcation of a shearable rod with nonlinear spring supports

V. B. Glavardanov, R. B. Maretic, M. M. Zigic, N. M. Grahovac\*

*Department of Mechanics, Faculty of Technical Sciences, University of Novi Sad, POB 55, 21121 Novi Sad, Serbia*

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### Abstract

The postbuckling behavior of a compressed elastic rod is studied. The rod is supported by two identical hardening spring supports at clamped ends. The constitutive equations of the rod take into account the effect of shear. For local bifurcation analysis the Liapunov-Schmidt method is used. It is shown that for the critical value of auxiliary parameter the lowest eigenvalue becomes double. This fact and double  $Z_2$  symmetry lead to the occurrence of secondary bifurcations for the values of auxiliary parameter near the critical one. For primary and secondary branches asymptotic expansions are constructed. Depending on the values of parameters of nonlinear spring supports and shear rigidity five different groups of bifurcation diagrams are found.

*Keywords:* shearable rod, nonlinear spring, mode interaction, primary bifurcation, secondary bifurcation

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\*Corresponding author. Trg Dositeja Obradovica 6, POB 55, 21121 Novi Sad, Serbia  
Tel: +381 21 485 2248; fax: +381 21 458 133  
*Email address:* ngraho@uns.ac.rs (N. M. Grahovac)

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