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reči u naslovu časopisa Non-Linear Mechanics: 1-1 / 1 časopisa

ISSN	Naslov	Servisi	IF 2013
0020-7462	International Journal of Non-linear Mechanics	SD, ERI	1.463

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☐ Rotary motion of the parametric and planar pendulum under stochastic wave excitation Original Research Article  
**In Press, Accepted Manuscript**, Available online 14 January 2015  
Anna Mielnicka, S. Narayanan, Marian Wiercigoch

☐ Discrete fractional order system vibrations Original Research Article  
**In Press, Corrected Proof**, Available online 25 November 2014  
K.R. (Stevanović) Hedrih, J.A. Tenreiro Machado  
Abstract Close research highlights PDF (1252 K)

**Highlights**

- A theory of free vibrations of discrete fractional order (FO) systems with a finite number of degrees of freedom (dof) is developed.
- Eigen characteristic numbers, the FO system of eigen main coordinates and independent eigen FO modes are determined.
- A generalized function of FO dissipation of energy and generalized forces for generalized coordinates are introduced.
- Extended Lagrange FODE of second kind, for FO system dynamics, is also introduced.
- A FO electrical resistor is introduced and its constitutive relation is formulated.

☐ Elements of mathematical phenomenology of self-organization nonlinear dynamical systems: Synergetics and fractional calculus approach Original Research Article  
**In Press, Corrected Proof**, Available online 22 November 2014  
Mihailo P. Lazarević  
Abstract Close research highlights PDF (771 K)

**Highlights**

- Elements of mathematical phenomenology of self-organization dynamical systems are presented.

The obtained results are illustrated.

**Structural analogies on systems of deformable bodies coupled with non-linear layers** Original Research Article  
*In Press, Corrected Proof, Available online 26 November 2014*  
Katica R. (Stevanović) Hedrih, Julijana D. Simonović  
[Abstract](#) | [Close research highlights](#) | [PDF \(1612 K\)](#)

**Highlights**

- Oscillatory resonant regimes in systems of coupled deformable bodies: plates, beams, belts or membranes.
- Phenomenological mapping and mathematical analogies of their structural models.
- Non-linear behavior phenomena: mode interactions, trigger of coupled singularities, resonant jumps and Hopf bifurcations.
- Amplitude and phase- frequencies curves in the resonant regimes.
- Stability of stationary two-frequency oscillating regimes.

**Rigid body coupled rotation around no intersecting axes** Original Research Article  
*In Press, Corrected Proof, Available online 26 November 2014*  
Lilijana Veljović, Aleksandar Radaković, Dragan Milosavljević, Gordana Bogdanović  
[Abstract](#) | [Close research highlights](#) | [PDF \(1534 K\)](#)

**Highlights**

- By vector connected to the pole and the axis the rigid body dynamics is described.
- Mass moment vectors can be new open way for applications in different areas.
- Variation of system parameters can change the dynamics of systems.

Fractional calculus approach is suggested to describe complex systems and processes.

**The mathematical phenomenological mapping in non-linear dynamics of spur gear pair and radial ball bearing due to the variable stiffness** Original Research Article  
*In Press, Corrected Proof, Available online 14 November 2014*  
Ivana Atanasovska  
[Abstract](#) | [Close research highlights](#) | [PDF \(1286 K\)](#)

**Highlights**

- Mathematical phenomenological mapping in non-linear dynamics.
- Non-linear dynamics of machine elements and systems.
- Vibration of spur gear pair and ball bearing.
- Stiffness functions for gear pair and ball bearings.
- Reduction the machine elements dynamics to the one-degree of freedom dynamics model.

**Rayleigh-Bénard convection instability in the presence of spatial temperature modulation on both plates** Original Research Article  
*In Press, Uncorrected Proof, Available online 14 November 2014*  
Miloš M. Jovanović, Jelena D. Nikodijević, Milica D. Nikodijević  
[Abstract](#) | [Close research highlights](#) | [PDF \(1720 K\)](#)

**Highlights**

- The random temperature perturbations of  $10^{-5}$  in all nodes are sufficient to excite almost all Fourier modes in viscous 2D channel flow with spatially varying temperature boundary conditions at  $Ra=1000$ .
- The flow pattern is steady in the initial time period ( $tscr/2$ ) when the boundary conditions are unsteady, and it becomes

**Chaotic behavior of a body in a resistant medium** Original Research Article  
*In Press, Corrected Proof, Available online 13 November 2014*  
Vladimir S. Aslanov  
[Abstract](#) | [Close research highlights](#) | [PDF \(1742 K\)](#)

**Highlights**

- Chaotic attitude motion of a rigid body in a resistant medium is studied.
- A biharmonic torque and small periodic perturbation act on the body.
- The biharmonic torque is an odd function of a nutation angle.
- Separatrix orbits and Melnikov function are determined in an analytical form.

**Generalistics of unsteady MHD temperature boundary layer** Original Research Article  
*In Press, Corrected Proof, Available online 13 November 2014*  
Dragiša Nikodijević, Živojin Stamenković  
[Abstract](#) | [Close research highlights](#) | [PDF \(1756 K\)](#)

**Highlights**

- Results presented in manuscript are in area of general characteristics of unsteady MHD temperature boundary layer, presenting as a fluid in coupled magnetic and temperature fields.
- Manuscript contains numerous graphical illustrations as results of analytical and numerical investigation interaction of different kinetic parameters of the coupled fields to the boundary fluid layer.

**Stability of an equilibrium position of a pendulum with step parameters** Original

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Stability of an equilibrium position of a pendulum with step parameters Original Research Article  
**In Press, Corrected Proof**, Available online 13 November 2014  
Anatoly Markeev  
▶ Abstract ▼ Close research highlights PDF (651 K)

**Highlights**

- A pendulum affected by step parametric disturbance is considered.
- Non-linear problem of stability is solved for hanging and inverse pendulums.
- The results are presented in the plane of two parameters of the problem.

Wave propagation in layer with two preferred directions Original Research Article  
**In Press, Corrected Proof**, Available online 13 November 2014  
Dragan Milosavljevic, Gordana Bogdanovic, Ljiljana Veljovic, Aleksandar Radakovic, Mirjana Lazic  
▶ Abstract ▼ Close research highlights PDF (314 K)

**Highlights**

- Equations for dispersion curves are obtained in form suitable for further analysis.
- Analysed plate is made of both highly anisotropic and constrained material.
- It has been shown that these two approaches may be connected by limiting process.
- Constraint of inextensibility leads to singular layers on the faces of the plate.
- Obtained dispersion relations give possibility to calculate distribution of displacements and stresses throughout plate

Autocatalator as the source of instability in the complex non-linear neuroendocrine model Original Research Article  
**In Press, Corrected Proof**, Available online 13 November 2014  
Stevan Mačesić, Željko Čupić, Slobodan Anić, Ljiljana Kolar-Anić  
▶ Abstract ▼ Close research highlights PDF (306 K)

**Highlights**

- Both autocatalator as well as the model of the Hypothalamic-Pituitary-Adrenal (HPA) axis was analysed by means of the stoichiometric network analysis (SNA).
- The types of bifurcations and conditions for their existence in both models were determined.
- Mathematical analogy between these two models was established.

Fast non-resonance rotations of spacecraft in restricted three body problem with magnetic torques Original Research Article  
**In Press, Corrected Proof**, Available online 12 November 2014  
Pavel Krasil'nikov  
▶ Abstract PDF (896 K)

Stability of triangular libration points in a planar restricted elliptic three body problem in cases of double resonances Original Research Article  
**In Press, Corrected Proof**, Available online 12 November 2014  
Olga Kholostova  
▶ Abstract ▼ Close research highlights PDF (327 K)

**Highlights**

Differential equations for librational motion of gravity-oriented rigid body Original Research Article  
**In Press, Corrected Proof**, Available online 12 November 2014  
E.A. Kosjakov, A.A. Tikhonov  
▶ Abstract ▼ Close research highlights PDF (395 K)

**Highlights**

- A new notation for attitude dynamics of gravity-oriented body is introduced.
- This form generalizes equations in canonical variations.
- Both the potential and the non-potential disturbing torques are operative.
- A perturbation torque is given by a cubic approximation.
- The equations are convenient for asymptotic analysis of a body non-linear oscillations.

Secular perturbations of quasi-elliptic orbits in the restricted three-body problem with variable masses Original Research Article  
**In Press, Corrected Proof**, Available online 12 November 2014  
A.N. Prokopenya, M.Zh. Minglibayev, B.A. Beketauov  
▶ Abstract ▼ Close research highlights PDF (342 K)

**Highlights**

- Differential equations determining the secular perturbations of the orbital elements in the restricted problem of three bodies of variable masses may be integrable.
- Possible values of two integrals of motion, corresponding to the integrable cases, have been found.
- Analytical solutions of the evolutionary equations have been found in terms of elementary and elliptic functions.

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**with variable masses** Original Research Article  
**In Press, Corrected Proof**, Available online 12 November 2014  
 A.N. Prokopenya, M.Zh. Minglibayev, B.A. Beketauov  
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**Highlights**

- Differential equations determining the secular perturbations of the orbital elements in the restricted problem of three bodies of variable masses may be integrable.
- Possible values of two integrals of motion, corresponding to the integrable cases, have been found.
- Analytical solutions of the evolutionary equations have been found in terms of elementary and elliptic functions.
- Points masses may vary isotropically with different rates while their sum reduces according to Meshcherskii law.

☐ **Interplay between internal delays and coherent oscillations in delayed coupled noisy excitable systems** Original Research Article  
**In Press, Corrected Proof**, Available online 12 November 2014  
 Ines Grozdanović, Kristina Todorović, Nebojša Vasović, Nikola Burić, Nataša Trišović  
[Abstract](#) | [Close research highlights](#) | [PDF \(813 K\)](#)

**Author-Highlights**

- We study variations in coherence of spike trains produced by two stochastically perturbed FitzHugh–Nagumo excitable systems with internal and coupling time-delays.
- Internal time-delay and the coupling time-delay in some domains of values can substantially increase or decrease the coherence.
- Dependence of the coherence on the delays is qualitatively explained by considering the bifurcations in the system caused by them.

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