Mathematics

STABILITY PROBLEMS AND NUMERICAL INTEGRATION ON THE POINCARE LIE GROUP

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Abstract. An underactued drift-free left-invariant control system on the Lie group $ISO(3, 1)$ is analyzed.

Keywords and phrases: spectral stability, Lie group.

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ON THE DYNAMICS OF A HAMILTON-POISSON SYSTEM

Cristian LĂZUREANU, Camelia PETRIŞOR

Abstract. The dynamics of a three-dimensional Hamilton-Poisson system is closely related to its constants of motion, the energy or Hamiltonian function H and a Casimir *C* of the corresponding Lie algebra. The orbits of the system are included in the intersection of the level sets H = *constant* and C = *constant*. Furthermore, for some three-dimensional Hamilton-Poisson systems, connections between the associated energy-Casimir mapping (H,C) and some of their dynamic properties were reported. In order to detect new connections, we construct a Hamilton-Poisson system using two smooth functions as its constants of motion. The new system has infinitely many Hamilton-Poisson realizations. We study the stability of the equilibrium points and the existence of periodic orbits. Using numerical integration we point out four pairs of heteroclinic orbits.

Keywords and phrases: stability, Lax formulation, optimal homotopy asymptotic method (OHAM), nonlinear differential system.

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SOME PROPERTIES OF CORTICAL BONES

Ioana - Ramona IOSIF

Abstract. In this paper are presented: structure of the bone tissue, anisotropic linear elastic models of cortical bone and Analysis numerical propagation of a cracks into the cortical bone. To determine the fracture mechanics parameters at the crack tip, the finite element method was implemented in the FRANC2D / L 1.5 software.

Keywords and phrases: cortical bone, anisotropic, FRANC2D /L.

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A GENERALIZATION OF YOUNG'S THEOREM AND SOME APPLICATIONS

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Abstract. A generalization of classical Young's inequality for non-convex linear combinations is given, followed by applications to functionals.

Keywords and phrases: Young's inequality, isotonic linear functional.

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APPLICATIONS OF THE NON-CONVEX YOUNG'S INEQUALITY IN HILBERT SPACES

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Abstract. A generalization of classical Young's inequality is applied for operators in Hilbert spaces.

Keywords and phrases: Young's inequality, operators, separable Hilbert spaces.

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SOME CONCEPTS OF FRACTIONAL DIFFERENTIAL CALCULUS USING *MATLAB*

Elena VASILACHE

Abstract. In the last years researches in fractional calculus was extended in many areas. For further study of its applications in Machanical Area this paper presents numerical methods for solving some differential fractional equations using MATLAB. This work contains methods for fractional calculus computations like "Grünwald-Letnikov method" or "Podlubny's matrix approach" and examples using MATLAB for solving ordinary fractional differential equations.

Keywords and phrases: fractional calculus, MATLAB, differential fractional equations, Grünwald-Letnikov.

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