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CONTENTS

Abstract: The main goal of the present paper is to derive the spin equations for the Kepler problem for two charged particles with radiation terms. The base of our investigations are the equations of motion for the Kepler problem of classical electrodynamics. We formulate and prove an existence-uniqueness theorem for periodic solution of the spin equations. We introduce a suitable function space and apply the suitable operator for periodic solutions assigned to the Kepler problem. Its fixed point is a periodic solution. The conditions formulated are verified for hydrogen-like atoms.

Abstract: This paper introduces path triangulation of points in a bounded, simply connected surface region, replacing ordinary triangles in a Delaunay triangulation with path triangles from homotopy theory. A *path triangle* has a border that is a sequence of paths $h : I \longrightarrow X, I = [0, 1]$. The main results in this paper are that (1) a cone $D \times I$ collapses to a path triangle $h \triangle K$, extending E. C. Zeeman's collapsible dunce hat cone theorem, (2) an ordinary path triangle with geometrically realized straight edges generalizes Veech's billiard triangle, (3) a billiard ball $K \times I$ collapses to a round path triangle geometrically realized as a triangle with curviliear edges, (4) a geometrically realized homotopy system defined in terms of free group presentations of path triangulations of finite cell complexes extends J. H. C. Whitehead's homotopy system geometric realization theorem and (5) every path triangulation of a cell complex is a good cover.

Abstract: Three species food chain system with the Beddington-DeAngelis functional response investigated for regular and chaotic evolutions under different feasible conditions in the framework of nonlinear dynamics. The Euler's method employed to transform the continuous model into discrete model. A number of bifurcation plots obtained by varying certain system parameters in turn while keeping other parameters constant. These diagrams show clearly regular evolution followed by chaos for certain range of changing parameter. Regular and chaotic attractors obtained for different parameter spaces.

Numerical calculations further extended to calculate Lyapunov exponents (LCEs), topological entropies and correlation dimensions of chaotic attractors for different sets of parameter values. Results of obtained are presented through graphics and tables and analysed properly.

Abstract: Here are researched in terms of multivariate fuzzy complete approximation to the multivariate unit sequences of multivariate fuzzy arctangent-algebraic-Gudermannian-generalized symmetrical activation functions based neural network operators. These operators are multivariate fuzzy analogs of earlier studied multivariate Banach space valued ones. The derived results generalize earlier Banach space valued ones into the fuzzy level. Here the high order multivariate fuzzy pointwise and uniform convergences with rates to the multivariate fuzzy unit operator are given through multivariate fuzzy Jackson type inequalities involving the multivariate fuzzy moduli of continuity of the mth order ($m \geq 0$) H-fuzzy partial derivatives, of the involved multivariate fuzzy number valued function. The treated operators are of averaged, quasi-interpolation, Kantorovich and quadrature types at the multivariate fuzzy setting.

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