Ondřej Kopáček
Astronomical Institute, Czech Academy of Sciences

Regular and Chaotic Motion in General Relativity: The Case of a Massive Magnetic Dipole

Authors: O. Kopáček, V. Karas, Y. Kojima, J. Kovář, P. Slaný, and Z. Stuchlík

Circular motion of particles, dust grains and fluids in the vicinity of compact objects has been investigated as a model for accretion of gaseous and dusty environment. Here we further discuss, within the framework of general relativity, figures of equilibrium of matter under the influence of combined gravitational and large-scale magnetic fields, assuming that the accreted material acquires a small (but non-vanishing) electric charge due to interplay of plasma processes and photoionization. In particular, we employ exact solution describing the massive magnetic dipole and we identify the regions of stability. We also investigate situations when the motion exhibits the onset of chaos. In order to characterize the measure of chaoticness we employ techniques of Poincare surfaces of section and of recurrence plots.