[구ST-09] Rotating stars with special relativistic features in the Newtonian gravity

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We obtained equilibrium solutions for rotating stars including the special relativistic effects with Newtonian gravitational potential. In order to fully incorporate the special relativistic effects, we used the concept of 'active mass' which takes into account all the possible sources that can generate gravitational potentials, such as the motions of fluid and the various energy densities, e. g. the internal energies, and the pressure, of course including the rest mass density. Such treatment could be applicable to the neutron stars with relativistic motions (i.e., rapidly rotating stars) or non-Newtonian equation of states. The hydrostatic equation is approximated from the general relativistic method. Then, we applied the Hachisu's self-consistent field(HSCF) method to find toroidal star sequences as well as spheroidal ones. Our equilibrium solutions show good agreement with those obtained by the fully general relativistic method.

[구ST-10] On the motion of test particles around a relativistic star emitting isotropic radiation

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Orbital geodesic motion of a test particle near non-rotating spherical star with uniform luminosity is investigated by assuming that the cross section σ of the test particle is independent of the energy and direction of the radiation from the star following the original formulation by Miller and Lamb. Through the numerical integration of the particle's trajectory, we found that final radial positions, where the test particles come to a "rest", depends only on the luminosity of the stars and is independent of the initial radial positions and velocities. Also, we found numerically that when initial azimuthal velocities are lower than the critical velocity determined by the luminosity, the test particle show the orbital behaviors of inflow motion alone, but in the case of larger initial velocities than the critical velocity, the particle shows the outward motion followed by the spiral-in.