gravitation [4] in four and five dimensions. We also discuss possible non-Abelian generalization of classical 4-dimensional Fokker's action in the N-point interaction scheme taking into account Vladimirov—Turygin perturbative scheme for Einstein's gravity [5] and the Kaluza—Klein approach.

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Geodesics in the Hartle-Thorne spacetime

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The influence of both rotation and quadrupole moment of a central body on the motion of a test particle is investigated in the Hartle-Thorne spacetime [1]. The Hartle-Thorne metric is given with accuracy up to the second-order terms in the body's angular velocity. We give, with the same accuracy [2], analytic equations for geodesics at arbitrary plane different from equatorial one and integrate them numerically.

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Regular solutions in GR with two scalar fields

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Regular solutions for two scalar fields in general relativity are considered. The potential for scalar fields is similar to Mexican hat but has ϕ^6 and ϕ^8 terms. The next cases are considered:

(a) domain wall, (b) boson stars, (c) cosmic strings, (d) thick branes, (e) wormholes. The higher order terms in the potential change the asymptotical behavior of the solutions in comparing with previously found solutions with potential having ϕ^4 terms [1]. The physical characteristics of such objects are discussed.

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Entropy principle for charged self-gravitating fluid in static spacetimes

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We show that for any perfect fluid in a static spacetime, if the Einstein constraint equation is satisfied and the temperature of the fluid obeys the Tolman law, then the other components of Einstein's equation are implied by the assumption that the total entropy of the fluid achieves an extremum for fixed total particle number and for all variations of metric with certain boundary conditions. Conversely, one can show that the extrema of the total entropy of the fluid are implied by Einstein's equation. The above results can be extended to uniformly charged perfect fluid. Compared to previous works on this issue, we do not require spherical symmetry for the spacetime. Our results suggest a general connection between thermodynamics and general relativity.

Electrodynamics of oriented point as a consequence of the real relativity principle

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In [1], the author put forward *the principle of real relativity*, with its first part stating the equivalency of real reference frames for the description of physical events (such as registering the flashes of light from a distant source):

All the real reference frames are equal to each other as a means of describing events.

The second part of the principle sets the requirement for the basic equations describing the laws of nature:

It is required of the equation expressing locally the law of nature to be invariant under transformations of coordinates of events between the real reference frames (L-covariance).