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Black holes in a rotating and expanding spacetime

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Black holes in a rotating and expanding space-time
In a previous paper [1], we have studied in detail the static non-empty symmetric geometry described by a metric based on an erfc gravitational potential. Although this new metric provides a consistent set of predictions and interpretations regarding some open problems in the solar system [2], the residual static offset incorporated in the erfc potential can also be reinterpreted in a dynamic context. In this paper, we propose, a mathematical equivalence to interpret and provide a plausible dynamic meaning for that constant scalar field. This can be done in two steps. First, the metric can be rewritten in an algebraically equivalent erf symmetric form. Then, interpreting the constant time offset into a spacetime rotation and the constant radial offset into a spacetime expansion, the static metric can be converted into a dynamic one. In other words, the problem is solved by proposing a more general axisymmetric geometry which describes a rotating massive body dragging its curved spacetime into a rotation and an expansion. The resulting length element is not invariant under time and azimuth coordinate transformations, which leads to revisit some basic properties of a rotating black hole dragging its spacetime in four dimensions. Although this asymmetric metric does not have any intrinsic singularity, it can give rise to non-singular black holes with a double horizon.

[1] Plamondon, R., (2018), General Relativity: an erfc metric, Results in Physics, 9, 456-462.
[2] Plamondon, R., (2017) Solar System Anomalies: Revisiting Hubble's law, Physics Essays, 30(4), 403-411.

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