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Self-Similar Solutions in Newtonian Cosmology

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We present a dark fluid model described as a non-viscous, non-relativistic, rotating, and self-gravitating fluid. We assumed that the system has spherical symmetry and the matter can be described with the polytropic equation of state. The induced coupled non-linear partial differential equation system was solved by using a self-similar time-dependent ansatz introduced by L. Sedov and G. I. Taylor. These kinds of solutions were successfully used to describe blast waves induced by an explosion since the Guderley–Landau–Stanyukovich problem. We showed that these kinds of solutions can provide new solutions that are consistent with the Newtonian cosmological framework. We have found that such solutions can be applied to describe normal-to-dark energy on the cosmological scale.

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