

Numerical computation of electromagnetically sourced nonlinear tails

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Amazingly, recent studies indicate that nonlinear effects are of great significance for modelling black hole ringdown. Transient electromagnetic events in the astrophysical environment are typically high-energetic, potentially responsible for some nonlinearities in ringdown. Motivated by the desire to understand these nonlinearities, we solve the inhomogeneous Bardeen-Press-Teukolsky equation numerically, and find second-order gravitational tails induced by an electromagnetic source. Our results suggest that the second-order tails of curvature perturbations with multipole numbers decay as at fixed spatial position and in retarded-time at null infinity, slower than their linear counterparts, which can play a role in multi-messenger observations.

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