

## Distributional sources for the second-order Einstein and Teukolsky equations

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To date, the only existing second-order self-force calculations have used some variant of a puncture scheme. In this scheme, one replaces the small object with a local singularity possessing the same curvature structure. This puncture field is truncated at some suitable distance from the particle and is then used as a source to solve for the residual field. From this, one can reconstruct the physical field. This method has been used due to the non-integrability of the second-order Einstein equations when in a generic gauge. However, recent work (2101.11409) formulated well-defined field equations in certain classes of gauges. However, while demonstrating the existence of well-defined field equations and a well-defined stress-energy tensor (the Detweiler stress-energy tensor), the field equations were not in a practical form to enable one to solve for the physical field. In this talk, we will present a more practical description of the second-order field equations and discuss how this could be implemented. We will also discuss how to use the distributional definitions adopted in 2101.11409 to derive the distributional part of the source for the second-order Teukolsky equation.

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