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Extreme mass-ratio inspiral of a spinning body into a Kerr black hole

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Accurate models of large mass-ratio systems must include post-geodesic corrections, which account for forces driving the small body away from the geodesic. An important post-geodesic effect is gravitational self-force, which describes the small body's interaction with its own spacetime curvature. This effect includes the back-reaction due to gravitational-wave emission that leads to the inspiral of the small body into the black hole. When a spinning body orbits a black hole, its spin couples to the curvature of the background spacetime. This introduces another post-geodesic correction called the spin-curvature force. We use osculating element integration to generate a spinning-body inspiral that includes both the backreaction due to gravitational waves and spin-curvature forces. We apply a near-identity transformation which eliminates dependence on the orbital phases, allowing for very fast computation of completely generic worldlines of spinning bodies. Finally, we calculate the gravitational waveforms and examine the dephasing of the waveform due to the presence of spin-curvature forces.

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