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Indirect determination of conservative self forces and orbital evolution LIOR M. BURKO, University of Alabama in Huntsville — We compare the corrections to Kepler's law with orbital evolution under a self force, and find the finite, already regularized part of the latter in a specific gauge. We apply this method to a quasi-circular orbit around a Schwarzchild black hole for an extreme mass ratio binary, and determine the first- and second-order gravitational self force in a post Newtonian expansion. Specifically, we find the part of the self-force that is quadratic in the mass ratio to 2PN order, and the part that is cubic in the mass ratio to 1PN (including the Newtonian self force for either order of the self force). Next, we use these results to compute the orbital evolution including both dissipation and the PN conservative self force, and find the gravitational wave forms. Finally, we include spin-orbit coupling, and find that the orbit-integrated conservative spin effects are comparable in magnitude to the conservative self force effects on the waveforms, even though the leading post Newtonian order of the former (1.5PN) is higher than that of the latter.

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