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Integrability of eccentric, spinning black-hole binaries at the second post-Newtonian order SASHWAT TANAY, LEO STEIN, Univ of Mississippi — The LISA mission is projected to observe eccentric binaries of spinning compact objects, which inspiral very slowly. Modeling gravitational waveforms from these systems is challenging because of the interplay of orbital, precession, and inspiral dynamics. Here we report on the integrability of the post-Newtonian (PN)Hamiltonian for eccentric, spinning black-hole binaries (BHBs), without resorting to averaging. Integrability is exact at 1.5PN, with 5 constants of motion in a 10 dimensional phase space. We show that the system is also integrable at the 2PN order in the PN perturbative sense. Integrability gives hope to finding long-term analytic solutions for the conservative motion. We then report progress in finding the action integrals and then proceed to show how to solve for the spin and orbital angular momentum vectors of a circular BHB in terms of elliptic functions.

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