Initial data for orbiting charged binary black holes with arbitrary spins

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It is important to have accurate complete waveforms for compact binaries with consistent deviations from general relativity (GR) in order to assess the various tests of GR that are being applied to gravitational wave data. Since astrophysical black holes are expected to have negligible electric charge, one can use numerical relativity simulations of charged binary black holes as a stand-in for calculations in alternative theories of gravity, where for many theories there are significant technical difficulties that are still being overcome. In particular, binaries of charged black holes will generically emit dipole radiation, which is a common prediction of modified gravity theories. We have generalized a standard method for constructing binary black hole initial data in GR to include electric charge and implemented this method in the spectral code SGRID. This method produces conformally curved initial data and allows for arbitrary spins on the black holes, as well as quasicircular orbits (including eccentricity reduction). We present the method and its implementation as well as initial results and test evolutions.

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