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Merger of white dwarf-neutron star binaries: Prelude to hydrodynamic simulations in general relativity VASILEIOS PASCHALIDIS, University of Illinois at Urbana-Champaign, MORGAN MACLEOD, THOMAS W. BAUMGARTE, Bowdoin College, Brunswick, ME, STUART L. SHAPIRO, University of Illinois at Urbana-Champaign — White dwarf-neutron star binaries generate detectable gravitational radiation. We construct Newtonian equilibrium models of corotational white dwarf-neutron star (WDNS) binaries in circular orbit and find that these models terminate at the Roche limit. At this point the binary will undergo either stable mass transfer (SMT) and evolve on a secular time scale, or unstable mass transfer (UMT), which results in the tidal disruption of the WD. The path a given binary will follow depends primarily on its mass ratio. We analyze the fate of known WDNS binaries and use population synthesis results to estimate the number of LISA-resolved galactic binaries that will undergo either SMT or UMT. We model the quasistationary SMT epoch by solving a set of simple ordinary differential equations and compute the corresponding gravitational waveforms. Finally, we discuss in general terms the possible fate of binaries that undergo UMT. If sufficient WD debris lands on the NS, the remnant may collapse, whereby the gravitational waves from the inspiral, merger, and collapse phases will sweep from LISA through LIGO frequency bands. If the debris forms a disk about the NS, it may fragment and form planets.

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