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Poynting-Flux-Driven Bubbles and Shocks Around Merging Neutron Star Binaries[1] M.V. MEDVEDEV, U. Kansas, A. LOEB, Harvard U. — Merging binaries of compact relativistic objects are thought to be progenitors of short gamma-ray bursts. Because of the strong magnetic field of one or both binary members and high orbital frequencies, these binaries are strong sources of energy in the form of Poynting flux. The steady injection of energy by the binary forms a bubble filled with matter with the relativistic equation of state, which pushes on the surrounding plasma and can drive a shock wave in it. Unlike the Sedov-von Neumann-Taylor blast wave solution for a point-like explosion, the shock wave here is continuously driven by the ever-increasing pressure inside the bubble. We calculate from the first principles the dynamics and evolution of the bubble and the shock surrounding it, demonstrate that it exhibits finite time singularity and find the corresponding analytical solution. We predict that such binaries can be observed as radio sources a few hours before and after the merger.

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