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A New Candidate for Magnetic Energy Dissipation in Neutron Star Binary Systems STEVEN BEKHOR, Michigan Plasma Physics Research Institute — Magnetic mountains, which build up against the confining stress of compressed equatorial magnetic fields through accretion over many Alfvén times, in low-mass X-ray binary neutron stars are likely sources of gravitational waves. In spite of the susceptibility of magnetic mountains to transient, toroidal ideal inviscid magnetohydrodynamic (MHD) instabilities, none of these is sufficient to disrupt the confinement of accreted matter to the poles. Nonetheless, magnetic relaxation is believed to occur on time scales comparable to the fiducial accretion time scale on the order of 10^5 to 10^8 years. In this study, a new mechanism for the dissipation of magnetic fields in systems of neutron star binaries via the coupling of large-amplitude gravitational waves to the background plasma flow is postulated. The mechanism invokes power loss in the Alfvén wave energy spectrum due to Joule heating as the waves accelerate upward in a gravitational potential field. This mechanism may account for much of the magnetic energy released by the stars without recourse to resistive effects. As a consequence, an analysis of the evolution of the global magnetic field's structure may provide some insight about the frequency and intensity of burst oscillations.

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