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Excitations of Alfven Wave by 3D Patchy and Intermittent Magnetic Reconnection

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Alfven waves make a central role in energy transfer of the solar atmosphere and heliosphere, with the potential to heat corona, accelerate solar wind, and drive Alfvenic turbulence. It has long been suggested that magnetic reconnection can generate Alfven waves through a relaxation of a highly curved reconnected field lines. Here, with a high-resolution simulation of 3D magnetic reconnection under the solar corona environment, we study this sketch and find that Alfven waves, whose features resemble to those of the Alfven Waves observed in the solar atmosphere, are continually and energetically excited by reconnection mainly through two ways. One involves the current sheet which experiences patchy and intermittent reconnections, and the other refers to the turbulence forming in the outflow regions. The Pointing flux carried by the excited upward-propagating Alfven waves can satisfy the requirements of plasma heating in the corona. This has implications for self-consistent considerations of energy budgets in the solar atmosphere and heliosphere.