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Generation mechanism of whistler-mode chorus emissions YOSHIHARU OMURA, Research Institute for Sustainable Humanosphere, Kyoto University — There has been significant progress in understanding the generation mechanism of whistler-mode chorus emissions in recent years. This is partly due to the successful reproduction of chorus emissions by computer simulations and partly due to precise observations of the emissions by spacecraft. We review nonlinear theory and simulations on the generation mechanism of chorus emissions that have been revealed by the simulations and observations. We describe the nonlinear dynamics of resonant electrons and the formation of electromagnetic electron holes or hills that result in resonant currents generating rising-tone emissions or falling-tone emissions, respectively. Each chorus element comprises many sub-packets in which nonlinear wave growth takes place above the threshold amplitude and saturates at the optimum wave amplitude for triggering emissions. We also describe the mechanism of nonlinear wave damping due to quasi-oblique propagation, which results in formation of a gap at half the electron cyclotron frequency, separating a single chorus element generated at the magnetic equator into upper band and lower band elements in off-equatorial regions.

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