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Warm electromagnetic lower hybrid wave dispersion ALIX VERDON, IVER CAIRNS, DON MELROSE, PETER ROBINSON, School of Physics, The University of Sydney, NSW 2006, Australia — Lower hybrid (LH) waves can interact resonantly with both electrons and ions, and so can transfer energy between electrons and ions. This property of LH waves is unusual and suggests that they may play a role in particle acceleration and heating in the wide variety of physical contexts in which they occur. Specifically, LH waves are believed to be relevant to the generation of radio emissions in the outer heliosphere, and possibly also to electron and ion acceleration in magnetic reconnection regions in Earth's magnetosphere and the solar atmosphere. In this paper a new analytic dispersion relation for LH waves is presented and compared with numerical results calculated using a fully electromagnetic code. It is shown that the new analytic dispersion relation agrees closely with the numerical results for the real part of the frequency. Surprisingly, ion magnetization effects are important for the imaginary part of the frequency (or equivalently, the damping rate), and can cause the continuous LH mode to break up into a series of segments of ion Bernstein modes. In addition, in situations where the electrons and ions have a net relative drift parallel to the magnetic field of many times the electron thermal speed, numerical results show that wave growth may occur in a mode near the LH frequency. Again, ion magnetization effects play an important role.

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