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Quasineutrality, self-adjointness and parallel force balance in Kinetic-MHD[1] JESUS J. RAMOS, M.I.T. — An alternative to the traditional formulations of Kinetic-MHD is presented, based on drift-kinetic equations in the reference frame of the complete fluid velocity. In this approach, the electric field is eliminated by exact algebraic transformations and the quasineutrality condition is satisfied without the need of any explicit enforcement. The moving frame drift-kinetic equations provide only the variables needed to close the fluid moment equations and are not redundant with any information contained in the fluid system such as the parallel force balance. Linearization about a Maxwellian equilibrium without flow yields a standard eigenvalue problem for the normal mode squared frequencies. A transparent proof of real squared frequency spectrum follows, when the plasma is spatially bound by either a rigid superconducting wall or a plasma-vacuum interface where the equilibrium density goes continuously to zero. At zero-frequency marginal stability, the Rosenbluth-Rostoker closures for the parallel and perpendicular pressures are obtained, in a solution with vanishing parallel electric field and non-zero fluid displacement that is identically consistent with quasineutrality and parallel force balance.

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