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The complete set of Casimirs in Hall-MHD[1] YOHEI KAWAZURA, Graduate School of Frontier Sciences, The University of Tokyo, ELIEZER HAMEIRI, Courant Institute of Mathematical Sciences, New York University — A procedure to determine all Casimir constants of motion in MHD[2] is extended to Hall-MHD. We obtain differential equations for the variational derivatives of all Casimirs which must be satisfied for any dynamically accessible motion of Hall-MHD. In an extension of the more commonly considered model, we also include the electron fluid entropy. The most interesting case, usually true for axisymmetric configurations, is when both the electron and ion entropy functions form families of nested toroidal surfaces. The Casimirs are then three functions of each of the entropies, involving fluxes of certain vector fields and the number of particles contained in each torus. If any of the species loses its nested tori, the number of the associated Casimirs is much larger (but physically less relevant).

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[2]E. Hameiri, Phy. Plasmas, **11**, 3423 (2004).

Yohei Kawazura
Graduate School of Frontier Sciences, The University of Tokyo

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