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Linear response theory for magnon transport in ferromagnetic insulators SHUICHI MURAKAMI, RYO MATSUMOTO, Tokyo Institute of Technology — We study transverse response of magnons in ferromagnetic insulators within linear response theory. In analogy with the corresponding theory for electrons [1], magnon transverse response is described, including the Hall effect, Nernst effect, and thermal Hall effect. As is also the case for electrons [1], the response functions for magnons consist of the Kubo-formula term, and the term corresponding to the orbital angular momentum. We can rewrite the response functions in terms of the Berry curvature in momentum space [2]. We apply this theory to the (quantum-mechanical) magnons and to the classical magnetostatic waves. For the magnetostatic waves, the eigenmodes are given by a generalized eigenvalue problem, giving rise to the special form of the Berry curvature [2]. We explain various properties of this Berry curvature for the generalized eigenvalue problem, and discuss its implications for the physical properties of magnetostatic modes. [1] L. Smrcka and P. Streda, J. Phys. C, 10, 2153 (1977); H. Oji, P. Streda, Phys. Rev. B 31, 7291 (1985); [2] R. Matsumoto and S. Murakami, Phys. Rev. Lett. 106, 197202 (2011); Phys. Rev. B 84, 184406 (2011).

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