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Theory of spin wave driven spin Seebeck effect[1] JIANG XIAO, Department of Physics, Fudan University, China, GERRIT BAUER, Kavli Institute of NanoScience, Delft University of Technology, The Netherlands, K. UCHIDA, E. SAITOH, S. MAEKAWA, Institute for Materials Research, Tohoku University, Japan — We propose an explanation for the recently discovered spin Seebeck effect in terms of a spin-pumping-current driven through a ferromagnet/normal metal interface by a difference between the magnon temperature in the ferromagnet and the electron temperature in the normal metal. This spin current is proportional to the temperature difference, which is excited by an applied heat current through the ferromagnet, the spin-mixing conductance of the interface, and the inverse of a temperature-dependent magnetic coherence volume, and can generate an inverse spin Hall voltage (spin Seebeck signal) in a normal metal contact attached to the ferromagnet. A simple diffusion theory for the magnon thermalization is consistent with the spatial variation of the spin Seebeck effect measured in the insulator yttrium iron garnet (YIG) but not in Permalloy. The estimated magnitude of the spin Seebeck effect agrees with the experiments on Permalloy, but is too small for YIG.

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