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Applications of the scattering theory of magnetization damping[1]

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Magnetization (or Gilbert) damping results from a combination of spin-orbit coupling and disorder. I review a scattering theoretical formulation of magnetization damping [1] implemented without parameters in density functional theory with a very efficient basis of tight-binding muffin tin orbitals [2]. By being able to handle scattering regions containing in excess of 10,000 atoms, the influence of various types of disorder can be studied, including temperature-induced lattice and spin disorder [3]. I discuss applications to the important itinerant ferromagnets Fe, Co and Ni [4,5] as well as to the binary substitutional ferromagnetic alloys Fe_xNi_{1-x}, Fe_xCo_{1-x}, and Co_xNi_{1-x} [2,5] where the prediction of a very low damping in the Fe_xCo_{1-x} system was recently confirmed by experiment [6]. Studies of damping in structurally [7] and magnetically [8] inhomogeneous systems of great current interest lead to a number of new insights and predictions.

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