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Viscosity contribution to the impurity resistivity of metals by means of the current-density functional theory VLADIMIR U. NAZAROV, Research Center for Applied Sciences, Academia Sinica, Taiwan, GIOVANNI VIGNALE, University of Missouri, Columbia, USA — Within the time-dependent density functional theory formalism we relate the impurity resistivity ρ of a metal to the friction coefficient Q of the metal for the same impurity moving with the infinitesimally small velocity, i.e., $\rho = n_i Q/n_e^2$ (1), where n_i and n_e are the concentrations of the randomly distributed impurities and the valence electrons, respectively. While Eq.(1) occurs trivial within the single-particle theory with the scattering at the *statically* screened impurities, its general validity within the many-body theory with the *dynamical* exchange and correlation included presents a progress. We utilize results [1,2] on Q of the electron liquid to put the electron-electron scattering contribution into the terms of the viscosity coefficients [3]. Calculations of the residual resistivity of aluminum as a function of the atomic number of the impurity are performed, improving the agreement with experiment compared to the single- particle theory [4]. [1].V. U. Nazarov, J. M. Pitarke, C. S. Kim, and Y. Takada, Phys. Rev. B **71**, 121106(R) (2005). [2].V. U. Nazarov, J. M. Pitarke, Y. Takada, G. Vignale, and Y.-C. Chang, Phys. Rev. B **76**, 205103 (2007). [3].G. Vignale, C. A. Ullrich, and S. Conti, Phys. Rev. Lett. **79**, 4878 (1997). [4].M. J. Puska and R. M. Nieminen, Phys. Rev. B **27**, 6121 (1983).

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