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Characterization of drag coefficients of a sphere in non-Newtonian fluids by energy dissipation rate HAE JIN JO, WOOK RYOL HWANG, Gyeongsang National University, YOUNG JU KIM, Korea Institute of Geoscience and Mineral Resources — Accurate prediction of the drag coefficient of a single particle in non-Newtonian fluid is often required for analysis of fluid particle systems: for examples, prediction of behavior of rock fragments in drilling system, design and operation of slurry pipelines and solid-liquid separation processes. In this study, we introduce an effective viscosity in terms of energy dissipation rate to define the viscosity of the non-Newtonian fluid, and estimate the settling velocity and drag coefficient using effective viscosity. This method is established on the balance of the energy dissipation rate such that the external power is dissipated within the system as viscous dissipation in a laminar regime. The effective viscosity is a function of the effective shear rate, and the effective shear rate is determined by the apparent shear rate, which is the ratio of flow velocity to characteristic length, and the two flow numbers which depend geometrical characteristics of flow field only, almost independent of rheological property of a fluid. [1]This work is supported by Korea Agency for Infrastructure Technology Advancement grant funded by Ministry of Land, Infrastructure and Transport (17IFIP-B133614-01, The Industrial Strategic Technology Development Program) and by the National Research Foundation of Korea (NRF-2019R1A2C1003974).

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