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A correction scheme for two-way coupled Euler-Lagrange approach on arbitrary grids[1] PEDRAM PAKSERESHT, SOURABH V. APTE, Oregon State University — The accuracy of Euler-Lagrange point-particle approaches can decay when the two phases are two-way coupled owing to the disturbance created by the point-particle force on the background fluid flow. Such disturbance produces an error since the fluid force closure models often rely on the slip velocity computed based on the undisturbed fluid velocity, which is not readily available in the two-way coupled simulations. Recently, few schemes have been developed for correcting this issue, however, they lack generality and are all calibrated for specific computational grids or a limited range of flow parameters. In this work, a novel correction scheme is developed that is free of any empirical expression and applicable for (i) any arbitrary shaped structured or unstructured grid, (ii) a wide range of particle Reynolds numbers, (iii) any arbitrary particle-to-grid size ratio, and (iv) unbounded and wall-bounded flows with complex geometries. The newly developed model is easy to implement, affordable, and highly accurate. Test cases performed on settling velocity of a single particle on different structured and unstructured grids, various particle Reynolds number, as well as unbounded and wall-bounded regimes, show the capability of the present model for a wide range of applications.

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