Euler-Lagrange point-particle (EL-PP) technique has been increasingly employed for solving particle, droplet and bubble-laden flows. Since flow around the individual particles is not resolved, the accuracy of the technique depends on the fidelity of the force law used for representing the fluid-particle momentum exchange that occurs at the microscale. The applicability of the standard EL-PP approach is however limited to (i) particles of size much smaller than the grid scale and (ii) dilute flows where inter-particle interaction is weak. In this talk we will discuss recent fundamental developments that begin to ease these limitations. With increasing numerical resolution, as the grid size approaches the particle size, we face the unpleasant prospect of force law becoming less accurate. This is due to the self-induced flow generated at the particle location, which corrupts the estimation of undisturbed flow velocity that is needed in the force evaluation. We will discuss theoretical approached to properly correcting for the self-induced flow. Finally, we will present the pairwise interaction extended point-particle (PIEP) model which rigorously extends the point-particle technique to higher volume fractions. This model systematically accounts for the precise location of all the neighboring particles in computing the hydrodynamic force on each particle. The model assumes pairwise interaction so that the perturbation flow induced by each neighbor can be considered separately and superposed. The generalized Faxén form is then used to quantify the perturbation force due to the presence of the neighbors. The PIEP model predictions are compared against corresponding DNS in a number of test problems.