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*Direct simulation of dense suspensions*

The modelling fluid particle flows calls for efficient solvers of Poisson-like problems on domains with (possibly many) holes. After a description of the native difficulties of the problem, we will give an overview of the several methods which have been proposed to address this challenge, and present some of them, paying a special attention to numerical efficiency, conditioning aspects, and accuracy. Among the methods we plan to present, let us mention the direct approach, based on a boundary fitted (and therefore unstructured) mesh, and some fictitious domain methods (based on a global mesh which covers the whole region of interest), like the Penalty Method, the Fat Boundary method, and saddle-point approaches.