The second option for sorting category would be: Acoustics: General

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Generalized Faxén's theorem: Evaluating first-order (hydrodynamic drag) and second-order (acoustic radiation) forces on finite-sized rigid particles, bubbles and droplets in arbitrary complex flows[1] SUBRAMANIAN ANNAMALAI, S BALACHANDAR, University of Florida Gainesville, FL — In recent times, study of complex disperse multiphase problems involving several million particles (e.g. volcanic eruptions, spray control etc.) is garnering momentum. The objective of this work is to present an accurate model (termed generalized Faxén's theorem) to predict the hydrodynamic forces on such inclusions (particles/bubbles/droplets) without having to solve for the details of flow around them. The model is developed using acoustic theory and the force obtained as a summation of infinite series (monopole, dipole and higher sources). The first-order force is the time-dependent hydrodynamic drag force arising from the dipole component due to interaction between the gas and the inclusion at the microscale level. The second-order force however is a time-averaged differential force (contributions arise both from monopole and dipole), also known as the acoustic radiation force primarily used to levitate particles. In this work, the monopole and dipole strengths are represented in terms of particle surface and volume averages of the incoming flow properties and therefore applicable to particle sizes of the order of fluid length scale and subjected to any arbitrary flow. Moreover, this model can also be used to account for inter-particle coupling due to neighboring particles.

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