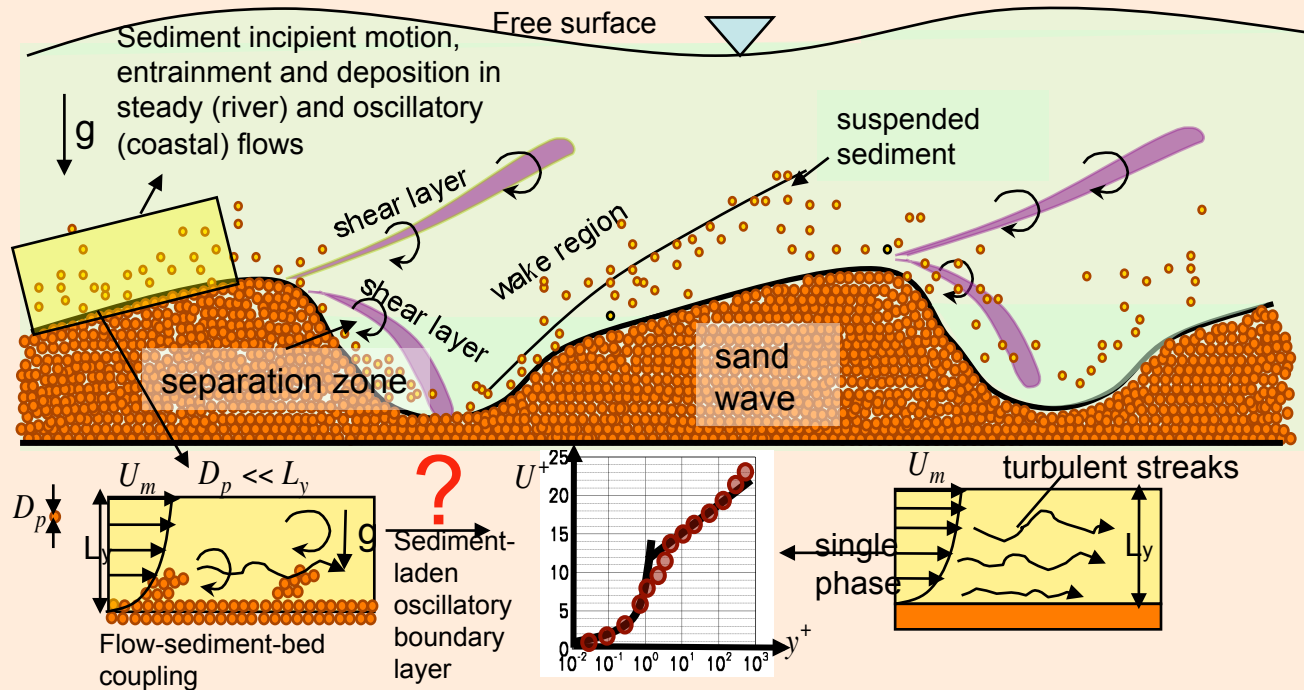




GRADUATE STUDENT PROJECT



A river or sea bed is made up of sediment particles that are in close contact with each other and retain the form of the bed through collision and cohesive forces. Shear stress due to fluid flow can mobilize and transport these particles as bedload (partially mobile bed of dense particles). Stresses exceeding a critical threshold can strip the particles from the bed, suspend them in the fluid and deposit them elsewhere. **Sediment transport, in rivers and coastal regions, affects large-scale geomorphic processes of dune formation, beach erosion and landform evolution that can displace human settlements, as well as destroy vegetation and agricultural infrastructure with strong socio-economic impact.** The broad range of spatio-temporal scales associated with particle-particle and particle-fluid

interactions makes modeling of sediment transport at practical scales extremely challenging. Lack of accurate criteria for onset of incipient motion and sediment pickup function remain two of the biggest hurdles in developing better predictive models for sediment transport.

In this project, fundamental numerical experiments investigating the flow-sediment-bed coupling in oscillatory boundary layers are planned. The novelty of this research is in the development and use of a **fully resolved simulation (FRS)** approach based on first principles, without requiring models for drag and lift forces, for the study of sediment incipient motion. This work will provide data on the temporal variations in the magnitude of drag and lift forces on

sediment grains, the time-scales associated with these variations, and their correlation to the sweep-burst events in turbulent boundary layers. State-of-the art high performance and parallel computing will be used.

We are looking for 2 PhD students starting Fall 2011 and until the positions are filled.

PREREQUISITES

Courses in Numerical Analysis
Knowledge of CFD and parallel computing
Good Programming Skills (F90+MPI)
Independent and Hard Worker
Self motivated

CONTACT

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