

## Longitudinal dispersion of heavy particles in an oscillating tunnel and application to wave boundary layers - DTU Orbit (08/11/2017)

### Longitudinal dispersion of heavy particles in an oscillating tunnel and application to wave boundary layers

The present research aims at getting an understanding of the process of dispersion of surface sediment in an oscillatory boundary layer, which may represent an idealised case of, for example, a stockpile area where excavated sediment is stockpiled temporarily (or permanently). The process is studied numerically, using a random-walk particle model with the input data for the mean and turbulence characteristics of the wave boundary layer picked up from a transitional two-equation  $k-\omega$  Reynolds averaged Navier–Stokes model and plugged in the random-walk model. First, the flowmodel is validated against experimental data in the literature. Then, the random-walk dispersion model is run for different oscillatory flow cases and for a number of steady flow cases for comparison. The primary sediment grains of concern are fine sediments (with low fall velocity), which would stay in suspension for most of the time. Nevertheless, the dispersion of neutrally buoyant and heavier particles that spend most of their time in close vicinity to the bed are also discussed. The numerical model results are compared with the results of a series of experiments carried out in an oscillating U-tunnel facility. The results are found to be in general agreement both qualitatively and quantitatively. In the last part of the study, an example application of the present model for fine sand dispersing in a wave boundary layer under storm conditions is given.

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