Assessment of Sediment Concentrations Accounting for Turbulence and Random Particle Alignment

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Recent experiments have established that the variance of the particles motion is not a linear function of time. This investigation hypothesizes that the fluctuation velocity based on bivariate probability distributions and particle-bed collision in open channel change the type of diffusion. The distribution of fluctuation velocity is obtained using the Gram-Charlier expansion which consider the first four statistical moments of random variable. The correlation between two-dimensional fluctuations is modeled by performing Monte Carlo simulations. Besides, the investigation includes a stochastic boundary condition, based on random particle alignment and mixed particle sizes. Particles collide with the surface of bed with various alignments and angles of incidence, whose associated probabilities depend on the conditional probability distribution of the collision height (CH). The collision process is verified against experimental data. The proposed model underestimates the saltation height and concentration close to the water surface . The variance of particle positions is estimated and discussed.