Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2017-101-RC1, 2017
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Geoscientific Model Development Discussions

Interactive comment on "SedFoam-2.0: a 3D two-phase flow numerical model for sediment transport" *by* Julien Chauchat et al.

Anonymous Referee #1

Received and published: 6 July 2017

General comments

This paper presents a 3D two-phase flow numerical model for sediment transport (SedFoam-2.0) in detail, including the mathematical formulation and the numerical implementations. The authors newly include the mixing length turbulence model, the $k-\omega$ model, and dense granular flow rheology into SedFoam. The main purpose is to provide a comprehensive numerical framework that solves the two-phase flow equations in three dimensions with the capability to select different combinations of turbulent model and granular stress model for sediment transport. This paper is well written and pleasant to read. The reviewer suggests acceptance after minor revisions.

Specific comments

Page 5: The authors state that h_{Exp} depends on the particulate Reynolds number. Its default value is 2.65 in SedFoam-2.0. To avoid misuse by users, it should be mentioned the range of the particulate Reynolds number in which $h_{Exp} = 2.65$ is applicable.

Page 14: Is the value of B_{phi} in Eq. (46) 1/3 as that in Eq. (43)?

Page 23, Figure 2: Lee et al. (2016) mentioned that SedFoam might yield fluctuating particle pressure. From Fig. 2, SedFoam-2.0 seems improve this weakness. How does sedFoam-2.0 improve this weakness?

Technical corrections

Page 11, Line 8: Double "are."

Page 24, Line 12: Change "210^{-4}" to "2×10^{-4}."

Reference

Lee C-H, Low YM, Chiew Y-M. Multi-dimensional rheology-based two-phase model for sediment transport and applications to sheet flow and pipeline scour. Phys Fluids 2016;28:53305. doi:10.1063/1.4948987.

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