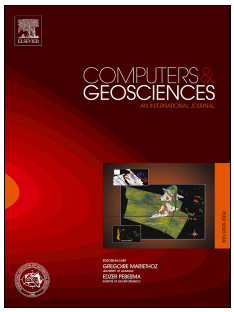
Accepted Manuscript



HydroSedFoam: A new parallelized two-dimensional hydrodynamic, sediment transport, and bed morphology model

Zhenduo Zhu, Jessica Zinger LeRoy, Bruce L. Rhoads, Marcelo H. García

PII: S0098-3004(18)30306-6

DOI: 10.1016/j.cageo.2018.07.008

Reference: CAGEO 4160

To appear in: *Computers and Geosciences*

Received Date: 21 March 2018

Accepted Date: 25 July 2018

Please cite this article as: Zhu, Z., LeRoy, J.Z., Rhoads, B.L., García, M.H., HydroSedFoam: A new parallelized two-dimensional hydrodynamic, sediment transport, and bed morphology model, *Computers and Geosciences* (2018), doi: 10.1016/j.cageo.2018.07.008.

HydroSedFoam: A new parallelized two-dimensional hydrodynamic, sediment transport, and bed morphology model

Zhenduo Zhu[a,*], Jessica Zinger LeRoy[b], Bruce L. Rhoads[b,c], Marcelo H. García[c]

[a] *Department of Civil, Structural and Environmental Engineering, University at Buffalo, The State University of New York, Buffalo, NY 14260 USA*
[b] *Department of Geography and Geographic Information Science, University of Illinois at Urbana-Champaign, Urbana, IL 61801 USA*
[c] *Ven Te Chow Hydrosystems Laboratory, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, Urbana, IL 61801 USA*

Abstract

Depth-averaged two-dimensional (2D) models are useful tools for understanding river morphodynamics through the computation of hydrodynamics, sediment transport, and an evolving river bed morphology. This paper presents a new parallelized 2D hydrodynamic, sediment transport, and bed morphology model, HydroSedFoam. The model uses the Message Passing Interface for code parallelization and adopts a depth-averaged $k-\varepsilon$ turbulence model. Three different case studies, including a laboratory experiment, an analytical solution, and a field-scale river reach, show good agreement with HydroSed-

*Corresponding author.

**Zhenduo Zhu develops HydroSedFoam. Jessica LeRoy performs meandering channel laboratory experiments and analyzes data. Bruce Rhoads and Marcelo García make substantial contributions to the development of ideas, data analysis, and interpretation of results. All authors participate in drafting and critically revisiting the manuscript.

Email addresses: zhenduoz@buffalo.edu (Zhenduo Zhu), jazinger87@gmail.com (Jessica Zinger LeRoy), brhoads@illinois.edu (Bruce L. Rhoads), mhgarcia@illinois.edu (Marcelo H. García)