

Modeling Shallow Geophysical Mass Flows

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Sediment-related disasters, such as debris flows, mudslides, rainfall-induced landslides, landslide dams and the subsequent dam-breaks, often result in severe hazardous consequences, especially due to global warming and the resulting extreme weather conditions (e.g., abnormal heavy rainfall). This seminar provides a brief overview of recent advances in modeling geophysical mass flows in mountainous regions, toward the feasibility of the framework “Digital Twin Engineering Geophysical Mass Flows”, a crucial solution for disaster mitigation, hazard assessment and safety management. The seminar will cover the following topics:

- Fundamentals: Depth-integration of conservative laws, shallowness assumption and Saint-Venant equations, etc.
- An overview of debris flow models (single-phase, quasi-two-phase, two-phase, and multi-phase models etc.)
- Grain-fluid two-phase model for debris flows and case studies
- GPU-accelerated simulation tool (Modeling on Shallow Flows with Efficient Simulation, MoSES)
- 3D user-interactive illustration platform (Advanced Numerical Scenario Illustration Platform, ANSI Platform).

