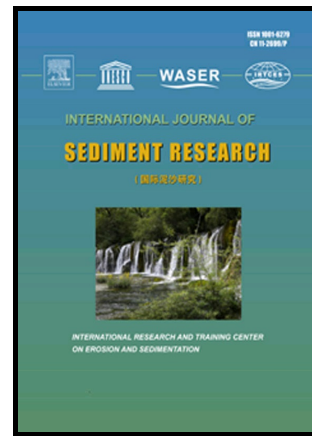


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M. Franzoia, M. Nones



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# Morphological reactions of schematic alluvial rivers: long simulations with a 0-D model

M. Franzoia<sup>a</sup>, M. Nones<sup>b,\*</sup>

<sup>a</sup>PhD, Department of Civil, Environmental and Architectural Engineering, University of Padova, via Marzolo 9, 35131 Padova, Italy

<sup>b</sup>PhD, Interdepartmental Centre for Industrial Research in Building and Construction - Fluid Dynamics Unit, University of Bologna Via del Lazzaretto 15/5, 40131 Bologna, Italy

*michael.nones@unibo.it*

## Abstract

The paper presents a 0-D model of an alluvial watercourse schematized in two connected reaches, evolving at the long time-scale and under the hypothesis of Local Uniform Flow. Each reach is defined by its geometry (constant length and width, time-changing slope) and grain-size composition of the bed, while the sediment transport is computed using a sediment rating curve. The slope evolution is provided by a 0-D mass balance and the evolution of the bed composition is computed by a 0-D Hirano equation. A system of differential equations, solved with a predictor-corrector scheme, is derived and applied to the schematic watercourse to simulate the morphological response to changing initial conditions, and the evolution towards long-term equilibrium conditions. Differently from a single-reach 0-D schematization with uniform grain-size, besides the simplifications adopted, the model proposed here simulates the behaviour of alluvial rivers in a physically-based way, showing a grain-size fining in the downstream direction accompanied by milder slopes, and a tendency to develop concave longitudinal profiles.

## Keywords

Alluvial rivers, Local Uniform Flow, Morphological equilibrium, Physically-based 0-D model, River morphology, Sediment transport

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