



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Institute of Environmental Engineering

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SEMINAR

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The competing effect of granular and fluid forces on step formation and stability in a steep channel subject to width variations

Abstract:

In this talk I will present results from flume experiments designed to study the effect of width variations on the formation and stability of steps in steep streams. To simulate wide and narrow areas but also widening and narrowing areas we inserted multiple trapezoidal elements in the flume. Experiments were conducted at 8% slope, without sediment feed and for different values of flow discharge. Two competing effects are in play: a fluidic effect, suggesting that steps are more likely to form in wide areas because of deposition enhanced by lower shear stress, and a granular effect, suggesting that steps are more likely to form in narrow areas because of particle jamming. The experiments show that width variations enhance the formation of steps, and, although steps formed in every location, those in narrow/narrowing areas are more common, more stable and they occupy a larger portion of the channel width. These results highlight the importance of particle interactions in coarse-bedded streams, and help river engineers by providing a new element to consider when designing step-pool sequences in river restoration projects.

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