



M.Sc. Topic

Evaluating the effects of physical properties on erosion of sand-mud mixtures

Background

Natural sediments are mostly mixtures of cohesive (mud) and non-cohesive (sand) sediments that can be found in rivers, lakes and estuaries. Excessive sediment accumulation can lead to malfunctioning of hydraulic structures (outlets), sedimentation of reservoirs and affect aquatic habitats. Therefore, the estimation of erosion and the task of achieving sustainable sediment management require appropriate attention. Due to the complexity of the cohesive sediment and the high dynamics during the erosion process, the knowledge in this area is still very limited. This master project will focus on studying the effects of physical properties (such as grain size distribution, void volume ratio and bulk density) on the erosion of sand-mud mixtures from experimental data, since the internal structure of sediment leads to different erosion mechanisms. First, the erosion of sediment mixtures with different grain distributions and same clay content will be examined, followed by an analysis of the relevance of the type of clay and its mean diameter. For this purpose, laboratory experiments with artificial mixtures and the use of an erosion flume (SETEG system) located in the Hydraulics Laboratory of the IWS are planned. The photographic data of the erosion test will be analyzed by the photogrammetric method obtaining values of the eroded volume and critical shear stress, which will be analyzed and compared with the existing literature.

Evaluating the effects of physical properties on erosion of sand-mud mixtures



Thesis Overview

1. Literature review on cohesive sediment transport and current research at the University of Stuttgart
2. Literature review on methodologies used in the field and in the laboratory to measure the initiation of erosion (critical shear stress)
3. Familiarize with experimental procedure and measure devices
4. Perform experimental tests to determine the critical shear stress of a set of artificial mixtures with different physical properties (varying the clay ratio, the grain distribution and the type of clay)
5. Analysis, interpretation, and evaluation of the experimental results within the main parameters

Desirable Skills

- Interest in fluid mechanics and/or experimental science



Apply now!

maria.ponce-guzman@iws.uni-stuttgart.de

Please send your CV and a few lines why you would like to take this topic.

Examiner: Dr. Stefan Haun (LWW) | Supervisor: Maria Ponce (LWW)