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Dynamic load
measurements at
Riprap Toe

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Background

Embankment dams are vulnerable to extreme flood events in turn leading to accidental overtopping of the dam core or even the dam crest as the dam is mainly made composed of pervious and erodible materials. Riprap defined as a permanent and erosion resistant ground cover of large elements such as natural rocks or artificial elements, has proven to be a cost-effective measure for erosion protection, structural stability and slope stabilization. Placed on the downstream slope of a rockfill dam, riprap can provide erosion resistance under throughflow and/or overflow conditions.

Numerous studies looking into the stability of embankment dams with steep downstream slopes ($S > 50\%$) under overtopping conditions have suggested that the probability of initiation of failure at the toe of embankment dams can be significant. This study is aimed at better understanding dynamic load generation mechanism at the toe which is one of the major factors influencing toe stability.

The existing physical model in the hydraulics laboratory, NTNU is used with slight modification to incorporate load measurement devices at the toe of the riprap as depicted in the picture below. A number of tests will be conducted and the results analyzed to arrive at a design criteria for the toe of the riprap.



Model riprap with load measurement device fixed at the toe.



Overtopping test showing highly turbulent flow at the toe of the riprap