ETH zürich

# Air detrainment of high-speed waters flows

Detrainment of an air-water mixture flow is important in water sciences. For high-speed flow as occur for instance on spillways, security concepts against cavitation damage have significant relevance. Provided the bottom air concentration of such flow decreases below, say 6 to 10% cavitation may cause large scale damage of concrete due to fracturing processes, as is illustrated in Fig.1 for the Karun dam in Iran. Given that a spillway is a major safety element for each dam, its loss may cause major structural damage to a dam, and inundations in the downstream valley. It is thus imperative to aerate spillways adequately to prevent uncontrolled flow conditions of flow.

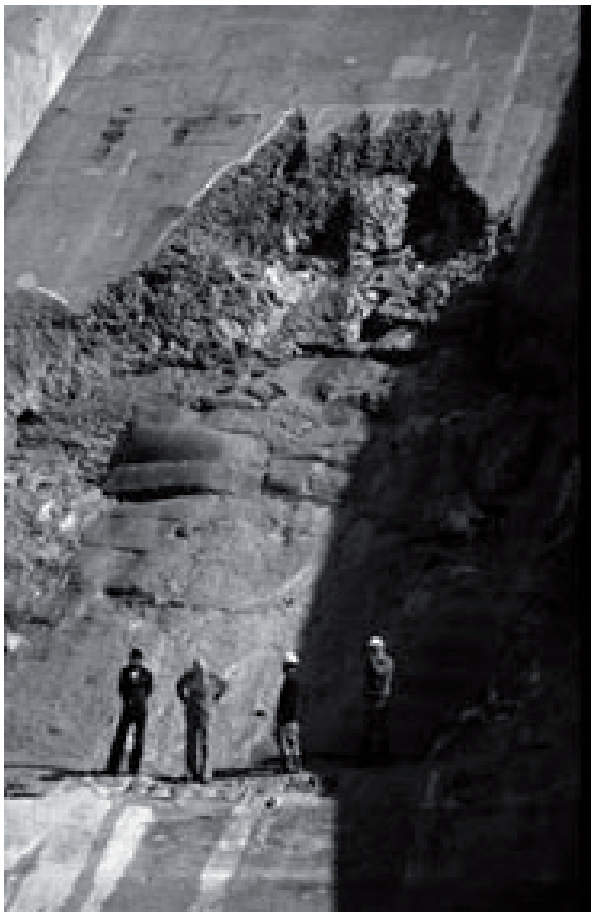

Fig. 1: Cavitation damage on Karun dam, Iran

**Main goals**

- Understanding of the general hydraulic behaviour of the air concentration in high-speed flows.
- Numerical detrainment simulations based on physical experiences.
- Definition of design guidelines for the distance required between chute aerators in high-speed flows.


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| Keywords: | spillway flow, aeration, cavitation protection, two-phase flow, hydraulics<br>Definition of design guidelines for the distance required between chute aerators in high-speed flows |



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