

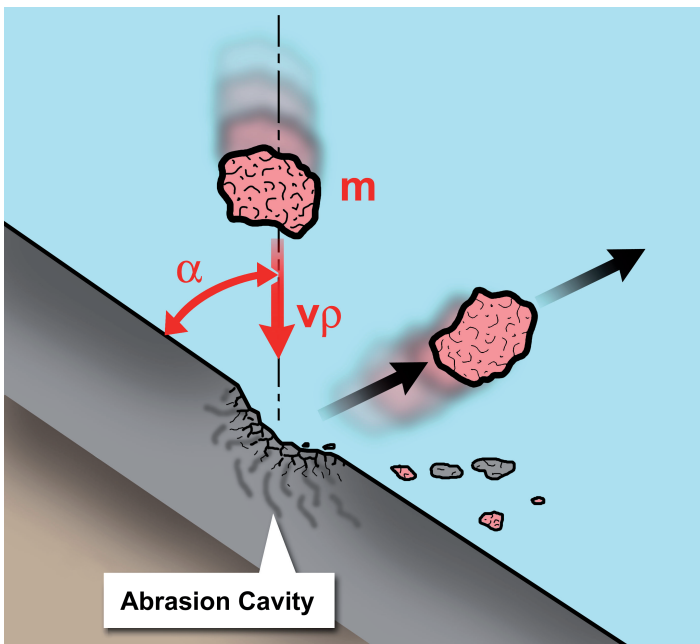
## Preventing Hydraulic Structures from Abrasive Concrete Erosion (2001)



In industrial countries annual costs due to abrasion of concrete surfaces of channels, conduits, weir structures or bottom outlets of high dams might be extremely high.

Abrasion or abrasive erosion here is understood as a surface erosion produced by water driven rigid particles.

The momentum of a solid particle is mainly defined by its mass, velocity and angle of attack. Velocity and angle result from the water flow field. The degree of hardness of a particle compared to the one of the concrete surface and the shape of a particle then predetermine the specific rate of abrasion caused by one single particle. As a consequence for hydraulic structures, the amount of dynamic contacts per unit time, i.e. the particle concentration and also the particle shape and size distribution have to be considered.



The VAW together with PSEL and TFB initiated a broad and comprehensive study on abrasion of concrete hydraulic structures in alpine regions including field investigations on selected specimens of 5 different concrete qualities.: MC (microsilica concrete), RCC (roller compacted concrete), HPC (high resistance concrete), SFC (steel fibre concrete) and PC (polymer concrete).

The whole study including all results and conclusions and also recommendations for the practitioner is published in the 130 pages report 168, 2001 of VAW (in German). An English written paper is submitted to Water Power and Dam Constructions.

As a conclusion the influence of the following material parameters on abrasion can be estimated : water-cement factor, compressive strength, modulus of elasticity and fracture energy.

Keywords: Abrasion, damage, pressure fluctuation  
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