**Dez Dam rehabilitation project, Iran - reservoir sedimentation by turbidity currents** (2008)

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**Introduction and objectives**

The Dez Dam was constructed in 1963 on the Dez River in southern Iran (Khuzestan) with the purpose of power generation, irrigation, water supply and flood control. It is a double curvature concrete arch dam with a height of 203 m and the created reservoir has an initial storage capacity of $3.315 \times 10^6$ m$^3$.

![Downstream view of the Dez Dam](image1)

Dez Reservoir is one of the many reservoirs in Iran which suffer from sedimentation. In its operational period, a sedimentation rate of 15 to $20 \times 10^6$ m$^3$/year has caused the sediment level behind the dam to raise close to the power intakes level (with a rate of approximately 1.2 m/year) and the delta front of coarse grained material has progressed 0.5 to 1 km/year towards the dam. Currently, the major issue which threatens the Dez Dam is the continual accumulation of silt in the reservoir near the dam endangering the operation of the entire hydraulic scheme.

![Longitudinal profiles over time of the Dez Reservoir](image2)

The aim of the study is to assess the plunging and the behaviour of a turbidity current event in the gorge part in the Dez Reservoir using a 2D CFD model. An observed flood event with measured turbidity current in the reservoir was used as bases for the simulation.

![Simulated 2D turbidity current in Dez Reservoir](image3)

Immediately after the start of the computation, after plunging, an advancing turbidity current with its characteristic head and following body forms. The current has an almost constant height, it does not dilute and increase in height, nor does it increase its concentration and accelerates in the narrow part of the reservoir. These parameters indicate a stable, conservative turbidity current.

**Conclusion and outlook**

The performed study confirms that turbidity currents occur in Dez Reservoir. These currents can be assumed to be almost conservative in the gorge part of the reservoir, therefore transporting its suspended load (with eventual additional re-suspended material for larger flood events) all the way down the wide part of the reservoir. The field observations showed that these currents reach the dam.

A solution for venting these turbidity currents would therefore evacuate significant amounts of sediment downstream the dam. Turbidity current venting is the most efficient solution which can considerably attenuate the sedimentation in Dez Reservoir. Therefore it can be considered as a sustainable solution.

The behaviour inside the enlargement of the Dez Reservoir and the subsequent narrowing towards the dam site has not been evaluated in this study, as the model is only 2D. In order to assess the transport potential of turbidity current all the way down to the dam, only a fully 3D simulation will allow doing so. This is planned to be performed early in the next project stage.