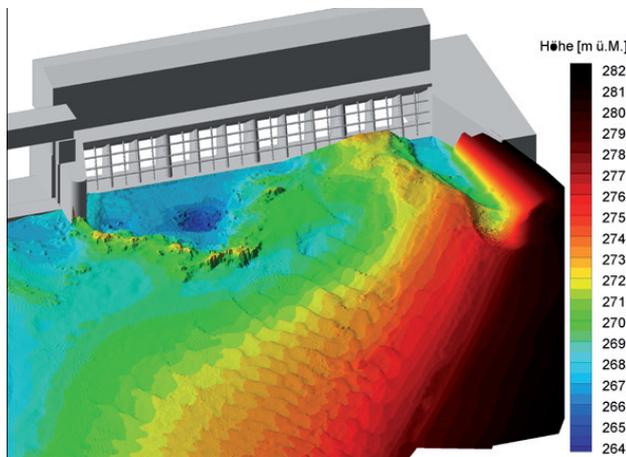


Estimation of sediment deposition processes at hydroelectric power plant with composite numerical model

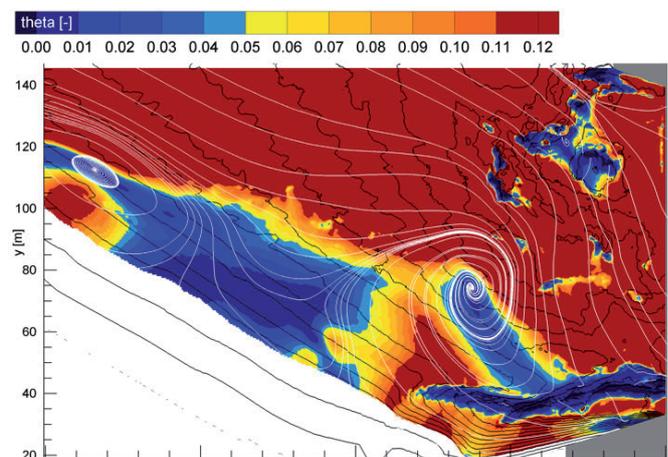
The hydroelectric power plant Ryburg-Schwörstadt is located at the river Rhine, about 25 km upstream from Basel. The barrier, with power house on the right and weir on the left, was built at the end of a right-hand river bend. During the years large sediment depositions aggregated in the backwater at the inside bend. Right in front of the power house the depositions attained a thickness of a number of meters. The impact of these depositions on the operation of the power plant as well as their future growth is uncertain.

The objective of this study is to estimate the potential of deposition and erosion in front of the power house by means of numerical simulation of the flow field. Furthermore, measures to reduce the deposition potential and to optimize intake flow are investigated.

Since the river flow and the flow near the power house may be of different type, a combined numerical model is proposed. In a first step, a 2-D depth-averaged model **BASEMENT** is used for the simulation of the river flow. In a second step, the flow near the power plant is computed by a 3-D model with boundary conditions derived from the 2-D model. Actually, the calculations do not consider sediment transport. However, the erosion and deposition potential is estimated based on the comparison of effective and critical shear stresses with respect to the mean grain size of the channel bottom sediment.



River bed topography in front of power house



Flow field in backwater of power plant

Keywords:	river power plant, sediment erosion and deposition, optimisation of intake flow, composite numerical modelling
Commissioned by:	Kraftwerk Ryburg-Schwörstadt AG

