



ADCP velocity measurement to validate a hydraulic model for a complex flow downstream a hydropower plant

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Regressive erosion processes occur on the foundations and on the cut-off wall downstream the EDF's hydropower dam of Cusset (Rhône River, France). To remediate the problem, a 3D hydraulic model was developed by EDF for sizing a concrete slab to be installed to protect the dam from erosion. In order to validate the results of the hydraulic model, in situ measurement were realized in July 2017 using an ADCP TRDI RioGrande 600 kHz associated with a GPS Leica Viva GS 14 GNSS compensating for positioning error thanks to RTK Orphéon (Geodata Diffusion). Some problems occur with the synchronization of the GPS and ADCP fluxes, such as the GPS position lagged behind the Bottom Tracking. A post-treatment allowed to resynchronize the two fluxes. The hydraulic conditions downstream the power plant were very challenging for ADCP, with fast (up to 7 m/s) and highly turbulent flows including a lot of bubbles. As a consequence, ADCP measurements showed a lot of invalid data. Image-based measurements (LSPIV) and Surface Radar Velocity (SVR) were also deployed to measure the free-surface velocities. Combination of those 3 measurements methods allowed to reach a good quality of data. Despite the difficult hydraulic conditions, the model outputs fit perfectly with the measurement, including local velocities and fluxes singularities. The model was so validated thanks to the measurements.