

## **Development of a hydrometric measurement series for the needs of rating curve estimation**

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Rating curve is the basis for correct designation of flow's values in water gauge cross section with a certain water level. It is approximated on the basis of rating curve measurements carried out at different water levels. Hydrometric measurements are subject to random and systematic errors. Random errors results from the manner and carefulness of carrying out measurements whereas systematic errors are mainly due to variability in the flow in time. Proper estimation of measurement's uncertainty affects the proper determination of the speed and consequently the rating curve.

In Poland, hydrometric measurements have been performed in most water-gauge cross sections for decades. The obtained results in the low waters' section are not always arranged according to a hydraulically determined rating curve. They often constitute a dispersed cloud of points with a weakly marked trend and high variance. The curve designated on the basis of them is subject to a high, difficult to estimate error.

The study presents a set of functions transforming a many-year measurement series carried out in a water gauge profile. Hydrometric measurements were carried out in the main channel. Then they were grouped into classes. The division into classes was performed as a two-step procedure. Firstly, the measurement results (uniform) which are arranged along rating curve were individualized. Secondly, the reasons for such a division was clarified. Changes in methodology and measurement techniques, the location of hydrometric profiles and changes in the geometric parameters and hydraulic sections have been taken into account.

In each class, the transformed values of water levels and its velocity are in accordance with the normal distribution. Consequently, it enabled us to designate the confidence intervals of compound regression in each observation class and choosing diverging measurement. In a consequence, corrected rating curves were generated. Its variability was determined and compared with rating curves which are binding in IMGW-PIB.

This method was used to evaluate the hydrometric measurement results in seven water-gauge profiles of Nysa Kłodzka River, left tributary of the Odra River, the south-western Poland.