Erratum to ”Uncertainty in open-channel discharges measured with the velocity-area method [Flow Meas. Instrum. 26 (2012) 18-29]”

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Erratum - Uncertainty in open-channel discharges measured with the velocity-area method (2012)

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Several formal mistakes can be found in the research paper published by Le Coz et al. [1] in Flow Measurement and Instrumentation. Their conclusions on the introduced method are still valid but the following errors may be detrimental to its correct implementation by others.

As stated in the original paper, uncertainty components written $u(X)$ are relative standard uncertainties (in % of measurand X). Therefore, the right-hand terms of Eqs. 12, 14, 15 and Eq. 16 should be divided by D_i and V_i, respectively. In Eqs. 14 and 15, the 'mid-section' and 'mean-section' mentions should be inverted. The presented results were not affected by these typos.

Two additional mistakes were actually included in our computations. The uncertainty component, u_s, accounting for systematic errors remaining after the best calibration of velocity, width and depth measuring devices was neglected in the application of Eq. 11, instead of being set to 1% as announced. This slightly affected the lowest uncertainty estimates, that typically cannot be lower than 2%. The main mistake lies in Eq. 15 where 8 should be replaced by 4, which means that the uncertainty components $u_m(D)$ were systematically underestimated in the presented results. Whereas it was previously obtained to be equivalent to $u_m(V)$, it is actually now twice bigger than $u_m(V)$, on average. This seems realistic since the transverse velocity profile is usually smoother than the bed profile.

The correct expressions for Eq. 14 and Eq. 15 are:

$$u_m(D_i) = \frac{b_i}{4\sqrt{3}D_i} \tan\alpha \qquad \text{(mean} - \text{section)} \qquad (14)$$

$$u_m(D_i) = \frac{b_{i+1}^2 + b_i^2}{4\sqrt{3}D_i(b_{i+1} + b_i)} \tan\alpha \qquad \text{(mid} - \text{section)} \qquad (15)$$

The corrected values of Table 2 in the original paper are presented in Tab. 2. Additional columns for u_s^2 and $u_{c,e}^2$ were included since these terms are no longer negligible for several cases. Typically, u_s^2 contributes for almost half of the variance for the measurements in the artificial canals (Gignac and Laboratory flume).

	$B/D/m$	max. slope	α	**$U(Q)$ (new)**	u_s^2 (ratio)	$u_{c,e}^2$ (ratio)	$u_m^2(V,D)$ (ratio)	u_p^2 (ratio)	u_{ed}^2 (ratio)	**$U(Q)$ (ISO748)**	u_m^2 (ratio)
Arc	5.0	15°	15°	**10.4%**	0%	0%	95%	5%	0%	**5.2%**	77%
Ardèche	0.5	41°	40°	**5.0%**	16%	5%	74%	6%	0%	**5.1%**	82%
Gignac	0.2	0°	10°	**2.9%**	48%	12%	2%	23%	12%	**13%**	98%
Laboratory	0.6	3°	5°	**3.0%**	44%	0%	2%	34%	17%	**3.5%**	60%
Doller	1.7	14°	15°	**7.7%**	7%	15%	74%	2%	1%	**9.8%**	90%

Table 2: Results of the uncertainty analysis of the stream discharge measurements test cases (after correction).

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[1] J. Le Coz, B. Camenen, X. Peyrard, and G. Dramais. Uncertainty in open-channel discharges measured with the velocity-area method. *Flow Measurement and Instrumentation*, 26:18–29, 2012.