Hydrol. Earth Syst. Sci. Discuss., 9, C7235–C7237, 2013
www.hydrol-earth-syst-sci-discuss.net/9/C7235/2013/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "An opportunity of application of excess factor in hydrology" *by* V. Kovalenko et al.

V. Kovalenko et al.

oderiut@mail.ru

Received and published: 19 July 2013

1. The article is written for the unknown language of Anonymous using long sentences. Answer. When this article was first presented to the journal, the comments were of a different nature, but not related to the incomprehensibility of the text. Otherwise, this paper would have to be rewritten in short sentences, in order to be more clear.

2. The authors advocate the use of excess factor (excess) to deal with the instability. Answer. Excess is not excessiveness; it is a compulsory factor to describe the entire class of Pearson's distributions, which results in the use of a linear shaping filter (2), it's true that it has the same meaning than kurtosis. A solution of (4) may be stable or unstable, regardless of the consideration introducing excess or not. However, ex-

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cess coefficient is one of the most unstable characteristic and it has significant impact on raising the tail of the function of probabilistic distribution, it means: also it has an influence in the probability of non-exceedance. Ignoring the excess and limiting distributions with fast falling tail (in particular the curves of Pearson type III), hydrologists subjectively exclude the possibility of a high probability of occurrence of significant water flow. The paper shows the potential use of excess coefficient (kurtosis coefficient) in hydrology.

3. The instability is not clearly defined. Answer. In the paper, after system (4) are clear statements on the instability of the solutions of differential equations systems for differents moments and representation of the beta-test as a relative intensity of the multiplicative noise. Also represented the numerical values for which there is a loss of stability for the moments of different order. What is more clear definition? Moreover, the notion of instability in the context of (4) was introduced in hydrology 15 years ago. The paper makes reference to the respective sources (3, 4, 5 into the list of references).

4. How excess factor uses help to deal with the instability? Answer. The numerical values of the excess coefficient indicate the nature of the function of probabilistic distribution already. For negative values, probabilistic distribution can be bimodal (usually this is an indicator of statistical inhomogeneity sample), for values close to zero: the distribution leads to the normal. With positive values - tails begin to rise to the greater extent, then higher value of the excess coefficient. Rising of the tail can be identified using beta-test. If it is equal to 0.5, then it produce loss of stability of the excess coefficient, the values are increasing and tails are rising. But direct manipulations of the excesses coefficient (kurtosis coefficient) are clearer for the hydrological purpose than beta-test.

5. Is the assessment of excess factors an index of stability and a way to estimate the tail of probabilistic distribution? Answer. Unambigously the excess coefficient is a way of the tail's estimation. As an "index of instability", widely discussed in the previous paragraph. Might be added that the excess coefficient is not an alternative to beta-

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test, but to some extent fulfills its functions in respect to the fourth moment: rising in the excess (kurtosis) indicates a trend towards the instability and, as a consequence raising tails. In V. V. Kovalenko Theoretical and Experimental Substantiation of the Correlation between the Fractal Dimension of Long-Term Flow Series and the Climatic Norm of Surface Air Temperature // Doklady Earth Sciences, 2012, Vol. 444, Part 2, pp. 782–786, are shown 756 rivers in the Northern Hemisphere, in particular in the range of climatic norms of surface air temperatures from –5 to 1.6° C, in average excess coefficient is close to zero, which provides stability for the fourth moment and also the possibility to use reliable probabilistic distributions in the third moment approximation (in particular Pearson Type III and Kritsky–Menkelya curves).

6. Comments for (11) for the excess errors. Answer. This formula wasn't developed by the signed authors. It was found in the "Handbook of Applied Statistics", translated from the English text (sixth number in the reference list). Even if it's not true, then other formulas give similar results.

7. Obviously, the statistical estimation are more stable when the number of observations increases. Answer. It is not clear that wants to say reviewer (anonymous). Authors do not endorse other, of course, if a studied characteristic is stable. They are based on empirical information; it means that after few decades of observation the variational coefficient of excess coefficient, can be stabilized at a value around 0.44. The average value of the excess coefficient can be assessed with an average error of 8 %. This opens the possibility of his practical use.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 13635, 2012.