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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical note: Analytical sensitivity analysis and uncertainty estimation of a two-component hydrograph separation method which uses conductivity as a tracer" *by* Weifei Yang et al.

Anonymous Referee #1

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The authors present a reasonable supplement to the conductivity two-component hydrograph separation method.

I have found only one smaller calculation error. Page 3, equation 14, and page 8, equations A8 and C1: In the second term in the numerator of the partial derivative dBFI/dyk a factor n is missing. It comes from the partial derivative of the sum of yk with respect to yk: (sum yk)' = d(sum yk)/dyk = sum dyk/dyk = n times 1 = n.

Some formulations are linguistically or technically incorrect. Please consider the fol-

lowing suggestions:

page 2, lines 10 - 11: Parameter sensitivity, as I understand this term, is the sensitivity of model output to the varying values of model input and not "the sensitivity of the parameters". Also, better than "fluctuation parameters" would perhaps be "varying parameter values". Replace "Eckhradt" by "Eckhardt".

page 2, line 12: Replace "An empirical sensitivity analysis is only an analytical calculation of the error propagation through the model, is not feasible." by "An empirical sensitivity analysis is only a makeshift if an analytical sensitivity analysis, that is an analytical calculation of the error propagation through the model, is not feasible".

page 2, line 14 Replace "However, the" by "Until now, the".

page 3, lines 5-6: Replace "the BFI' errors caused by tiny errors of BFC and ROC can be expressed as" by "the errors of BFI caused by small errors of BFC and ROC can be approximated by".

Throughout the paper, the sensitivity indices should be noted with vertical bars, and not with slashes (e. g. S(BFI|BFc) instead of S(BFI/BFc)).

page 3, lines 16 - 17: Replace "e.g. S(BFI/BFc) = 1.5, the relative error of BFc is 5%, then the relative error of BFI should be 1.5 times 5% (7.5%)" by "e.g. if S(BFI|BFc) = 1.5, and the relative error of BFc is 5%, then the relative error of BFI is 1.5 times 5% = 7.5%"

page 3, line 26: If the unit of Qck is μs/cm, then the unit of the partial derivative of BFI with respect to Qck is cm/μs.

page 3, line 27, page 8, lines 16 and 22: If the unit of yk is m3/d, then the unit of the partial derivative of BFI with respect to yk is d/m3.

page 4, line 3: Omit "usually".

page 4, lines 2-5, and lines 6-10: These two paragraphs express one and the same

("the error of BFI caused by the errors of Qck and yk can be neglected"). Then, this is empirically shown again in rest of this section, including figures 1 and 2. Is this necessary? If the sum of delta Qck and the sum of delta yk were not zero for n to infinity, then delta Qck and delta yk did not stand for random errors, but for systematic errors.

page 5, line 3: Replace "a parameter g is calculated" by "a variable g is calculated".

page 5, line 5: Equation 17 is the Gaussian error propagation. The citation "(Taylor, 1982; Kline, 5 1985; Genereux, 1998)" is not appropriate in this context.

page 6, line 24: Replace "The sensitivity index" by "The absolute value of the sensitivity index".

page 6, line 25: Replace "-1.39 times of uncertainty in BFI (-6.95%), while ROC leads to -0.98 times (4.9%)" by "-1.39 times 5 % of uncertainty in BFI (-6.95%), while ROC leads to -0.98 times 5 % (4.9%)".

Fig. 3: Replace "normal axes" by "linear axes".

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