

## **Global Sensitivity Analysis for Watershed Modeling: A Comparative Study**

Barmak Azizimoghaddam<sup>1</sup> and Mazdak Arabi

Department of Civil and Environmental Engineering, Colorado State University, Fort Collins

**Abstract.** This paper compares the efficiencies and performances of three widely-used global sensitivity analyses for watershed studies. The qualitative screening method of Morris, the Fourier Amplitude Sensitivity Test (FAST) and the method of Sobol' were linked with the Soil and Water Assessment Tool (SWAT) to study flow processes in the Cache la Poudre River Basin, CO. The Morris's screening method required a smaller number of model evaluations to compute the sensitivity measures than the other methods evaluated, which for practical considerations is favorable. The advantages of using FAST and Sobol' method is that they yield a quantitative estimate of the main effects of model parameters as well as the effects of the interactions between parameters. Several replication of the FAST and Sobol' procedures showed the inconsistency of the sensitivity measures at lower number of computational samples. Thus, inferences about input sensitivities were not reliable.

---

<sup>1</sup> Tel: (970) 492-2838; e-mail: [barmak@engr.colostate.edu](mailto:barmak@engr.colostate.edu)