Sensitivity analysis of a final repository model using the RS-HDMR meta-modeling approach provided in the SobolGSA software

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The sensitivities of a performance assessment (PA) model for a final repository for low- and intermediate-level radioactive waste are studied using the Random Sampling-High Dimensional Model Representation (RS-HDMR) meta-modeling approach provided in the SobolGSA software. Sensitivities of individual parameters and parameter interactions can be determined by means of first- and higher-order variance-based sensitivity indices. With traditional approaches like the Sobol' and the EFAST method, in particular estimation of sensitivity indices of total order may not be practically possible due to high computational costs. The Random Sampling-High Dimensional Model Representation (RS-HDMR) meta-modeling approach provided in the SobolGSA software can compute Sobol' sensitivity indices of the first, second and total order. The obtained first-order indices are well comparable to those calculated by two other methods, EASI and SDP. The RS-HDMR approach calculates the first-, second- and total-order indices in one step in no more time than is needed for computing the first-order indices alone with the EASI method, and much faster than SDP. The consistency of the second- and total-order indices are currently examined for different cases by means of the sums of first and second order indices.