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Fast Gaussian Process Calibration of Computer Models with Large Ensembles

Statistical model calibration of computer models is commonly done in a wide variety of scientific endeavours. In the end, this exercise amounts to solving an inverse problem and a form of regression. Gaussian process models are very convenient in this setting as non-parametric regression estimators and provide sensible inference properties. However, when the data structures are large, fitting the model becomes difficult. In this work, new methodology for calibrating large computer experiments is presented. We proposed to perform the calibration exercise by modularizing a hierarchical statistical model with approximate emulation via local Gaussian processes. The approach is motivated by an application to radiative shock hydrodynamics.