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and identically distributed normal random variables with mean zero and unknown variance σ^2. The computer output function and the physical true process are linked by

$$\zeta(\cdot) = y^s(\cdot, \theta) + \delta(\cdot), \tag{2.2}$$

where θ denotes the "true" calibration parameter in the sense of "best-fitting" value of the calibration parameter (Kennedy and O'Hagan (2001)), and δ denotes an underlying discrepancy function between the physical process and the computer model under the true calibration parameters. It is reasonable to believe that in most computer experiment problems, the discrepancy function δ should be nonzero and possibly highly nonlinear because the computer codes are usually built under assumptions or simplifications that do not hold true.

To estimate θ and δ, we follow a standard Bayesian procedure by imposing certain prior distributions on the unknown parameters θ and σ^2 and the unknown function $\delta(\cdot)$. In the computer experiment literature, a prominent method is to use a Gaussian process as the prior for an unknown function (Santner et al. (2003)). There are two major reasons for choosing Gaussian processes. First, the sample paths of a Gaussian process are smooth if a smooth covariance function is chosen, which can be beneficial when the target function is smooth as well. Second, the computational burden