**On “true values” of the parameters…**

There are “true values of the inputs” (\*). We don’t know these, and simoutput(variableinputs) will thus be wrong. simoutput(variableinputs, u) will bring us closer and a good or the best-we-can u is arrived at using observations and derpivating posteriors for ‘the true value’ of u. Even if u = θ, simoutput(variableinputs, θ) is still wrong, due to modeldiscrep(variableinputs), so \* can’t mean those inputs which lead to perfect predictions of the outputs.

Using the model

obs = realprocess(variableinputs) + residvarobserror

= ρ simoutput(variableinputs, calibinputs) + modeldiscep(variableinputs) + residvarobserror

with the central part able to be viewed (not perfectly but usefully) as a non-linear regression model. The regression function is defined by the simulator itself, through the (variableinputs, calibinputs) term, with parameters ρ and calibinputs. Then the terms modeldiscep(variableinputs) and residvarobserror can be viewed at residuals. **In this content, the “true value” of** calibinputs **has the same meaning as the true values of regression parameters – the true** calibinputs **is a best-fitting** calibinputs**.**

The calibration inputs will generally have been given concrete physical meanings but the people who built the simulator, but the actual values of these quantities in the real world don’t necessarily equate to θ, an inevitablility when it is accepted the odel can’t ever be a perfect fit. It may be that a

**On the relationship between the simulator output and reality…**

One way to model the relationship between the simulator’s output and reality is

realprocess(variableinputs) = ρ simoutput(variableinputs, calibinputs) + modeldiscep(variableinputs)

**Assume you know the calibinputs** and **you can make as many runs of the sim as you want**, in order to observe simoutput(variableinputs, calibinputs) for various variableinputs. Suppose first that to predict realprocess(variableinputs’) at some specific point variableinputs’ we would deem it sufficient to observe simoutput(variableinputs’, calibinputs) (a single run at variableinputs’).