

1154-28-1955

Troy Butler* (troy.butler@ucdenver.edu) and **Wenjuan Zhang**. *An Interactive Guide to Data-Consistent Solutions for Stochastic Inverse Problems, Part I: The Role of Set-Valued Inverses.*

(Brief Note: We utilize Jupyter notebooks to re-create some of our published results in real-time, build a computational intuition, and aid in transparency and reproducibility.)

Models are useful for simulating key processes and generating significant amounts of (simulated) data on quantities of interest (QoI) from a model solution. This data can be compared directly to observable data to address many important questions in scientific modeling. However, many key characteristics governing system behavior described as input parameters in the model remain hidden to direct observation. Thus, scientific inference fundamentally depends on the formulation and solution of a stochastic inverse problem (SIP) to describe sets of probable model parameters.

We have recently developed a "Data-Consistent" approach to solve the SIP based on measure-theoretic principles and set-valued inverses. An attractive aspect of this approach is that requires only a single solution to an associated stochastic forward problem in order to construct the data-consistent solution to the SIP.

In part 1, we briefly summarize this approach including existence, uniqueness, and stability of solutions. A brief comparison to statistical Bayesian inference is also provided. (Received September 16, 2019)