

Design For Variation / Design For Six Sigma

Challenges Interfacing Physical Experiments and Computer Models

- ▲ Computational issues in Bayesian model calibration
 - Lack of commercial software availability, full or modular Bayes
 - Difficulties in large transient model calibration
 - Need to include uncertainty in measured variable input
 - Lack of more general MCMC tools. Something like WinBUGS , but that would allow users to call general software to evaluate deterministic nodes
- ▲ Better probability models for variation in internal/external structures with complex geometry
 - Data: 40k+ measurements per part
 - Also need to be predictive (model the manufacturing process that forms the part)
- ▲ ‘Optimal’ (reasonable?) design of physical experiments for model calibration
- ▲ Design optimization under uncertainty
 - (Dis)advantages of various formulations (including robust design)
- ▲ Discrepancy root cause investigation structure
 - Sometimes instrumentation technology can rival model technology
- ▲ Lack of textbooks, engineering methods / applications papers
 - Joint publication with engineering departments would be useful
- ▲ High dimensional data visualization