1142-60-6 **Brad Marvin** (`tanbui@ices.utexas.edu`) and **Tan Bui-Thanh***, 210 East 24th street, Austin, TX 78712. *Fast Methods for Bayesian Optimal Experimental Design.*

We cast data assimilation problem into a model inadequacy problem which is then solved by a Bayesian approach. The Bayesian posterior is then used for Bayesian Optimal Experimental Design (OED). Our focus is on the A- and D-optimal OED problems for which we construct scalable approximations that involve: 1) randomized trace estimators; 2) Gaussian quadratures; and 3) trace upper bounds. Unlike most of contemporary approaches, our methods work directly with the inverse of the posterior covariance, i.e. the Hessian of the regularized misfit for linear data assimilation problems, and hence avoiding inverting large matrices. We show that the efficiency of our methods can be further enhanced with randomized SVD. Various numerical results for linear inverse convection-diffusion data assimilation problems will be presented to validate our approaches. (Received May 07, 2018)