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Optimization of Groundwater Models

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Our goal is to estimate the parameters, specifically hydraulic conductivity, that determine subsurface groundwater flow in saturated domains. Modeling such flow can be computationally intense; large models have unknowns numbering in the tens of millions. Our research constructs a reduced order model (ROM) using Proper Orthogonal Decomposition (POD). This POD model will reduce the degrees of freedom from millions of unknowns to tens. We will use PEST (Parameter ESTimation) as our optimization software. The model software, ADH, is under development at ERDC in Vicksburg, MS. Our results on 3-D domains demonstrate an order of magnitude fewer calls to the full, expensive model without sacrificing accuracy in the final solution.