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POD Calibration for ADH

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We are solving inverse problems in groundwater modeling. Given values of hydraulic head at discrete locations, we seek to approximate values of hydraulic conductivity for the entire field. We are using ADH, a finite element code developed at the Coastal Hydraulics Lab in Vicksburg, MS. When using ADH to model large, complex groundwater behavior – for instance the entire state of Florida – extreme run-times prohibit the frequent function calls needed for parameter estimation. Proper Orthogonal Decomposition (POD) is a method to reduce the size of the problem to calibrate ADH, reducing the number of full function calls needed. We will introduce the problem, discuss POD and how it is used for steady-state problems, and demonstrate the accuracy of the POD solution compared to the full ADH solution.