O-PCA Code Organization

The optimization-based PCA (O-PCA) code in this folder corresponds to the method described in the paper "A new differentiable parameterization based on Principal Component Analysis for the low-dimensional representation of complex geological models," by H.X. Vo and L.J. Durlofsky. The code here is only for the O-PCA algorithm itself (presented in Sections 2 and 5 of the paper); the portions of the code that link directly with a flow simulator (e.g., the history matching algorithm) are not included.

In order to run the O-PCA code, users should start from OPCAMain.m. There are two examples that can be run. These correspond to a binary model and a bimodal model. The user should select the desired model and comment out the other model by following the instructions in the OPCAMain.m file. We suggest that users read Sections 2 and 5 of the paper in detail, and familiarize themselves with the code, before running it. All of the MATLAB files include comments so the code should be understandable.

Note that the Matlab Optimization toolbox for the O-PCA numerical solution can be downloaded from:
http://www.di.ens.fr/~mschmidt/Software/minConf.html

The Matlab toolbox mGstat, used to generate the experimental semivariogram, can be downloaded from: http://mgstat.sourceforge.net/

SGeMSSim subfolder

This folder contains binary and bimodal realizations generated by the geostatistics software package SGeMS. These realizations are required to construct the O-PCA model.