#########################################################################

1) Comet FEM -> FEM

sigma = (0.00075, 0.00050)

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# System

stochastic = False # random seeds for the experiments

RANDOM\_SEED = 123446 # sampling seed

NUMPY\_SEED = 123 # Numpy seed

# True model

mu\_true = 2 # diffusion parameter

theta\_true = np.pi # advection angle parameter

n\_params = 2 # number of unknown quantities

x\_0 = np.array([0.5,0.5]) # center of the bump source-force

forcing = '10\*exp(-50\*pow( pow(x[0]-x\_00, 2) + pow(x[1]-x\_01, 2), 0.5))' # forcing term in the PDE

noise\_scale = 0.0001 # noise scale in the output data

# PDE solver

poly\_degree = 2 # polynomial degree for the FEniCS solver

n\_data\_hv\_true = 256 # number of segments on both vertical and horizontal axis, for the true model

n\_data\_hv\_levels = np.array([16,32]) # number of segments on both vertical and horizontal axis, for each level of approximation

# Priors for unknown parameters

lower\_mu = 0.1 # lower bound for mu (supposing mu ~ Uniform)

upper\_mu = 5 # upper bound for mu

lower\_theta = 0 # lower bound for theta (supposing theta ~ Uniform)

upper\_theta = 2\*np.pi # upper bound for theta

# starting point

use\_MAP\_as\_start = False # set true to use MAP as starting point, else uses [mu\_0, theta\_0] (sembra dare problemi MAP)

mu\_0 = 3.5 # initial guess for mu unknown parameter

theta\_0 = 2 # initial guess for theta unknown parameter

# Likelihood

sigma = np.array([0.00075,0.00050]) # value that determines the variance in the likelihood (first: coarse; last: fine)

plot\_likelihood = True # plot likelihood at each level

n\_ref\_lik = 30 # precision of the grid for the plot

contour\_lik = 10 # number of contour lines in each plot

# MCMC: Metropolis and MLDA

perform\_M = False # perform the Metropolis sampling

ndraws\_M = 3000 # number of draws from the distribution for M

nburn\_M = 1000 # number of burn-in samples for M

nchains\_M = 1 # number of chains for M

perform\_MLDA\_without\_variance\_reduction = True # perform the MLDA sampling without variance reduction

perform\_MLDA\_with\_variance\_reduction = False # perform the MLDA sampling with variance reduction

ndraws\_MLDA = 3000 # number of draws from the distribution for MLDA

nburn\_MLDA = 1000 # number of burn-in samples for MLDA

nchains\_MLDA = 1 # number of chains for MLDA

nsub\_MLDA = 2 # subsampling rate for MLDA

tune = True

tune\_interval = 100 # set high to prevent tuning

discard\_tuning = True