

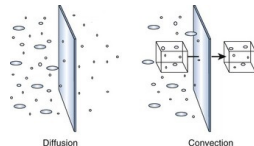
## Optimal black-box stopping test

Iterative solvers for symmetric and nonsymmetric  
linear systems with stochastic PDE origins

### Stochastic PDE

Solution = FEM + Linear algebra

Approximation error **controls** Algebraic error



For fixed stochastic and spatial parameters

### Fact

Approximation error is fixed

No decrease in approximation  
error beyond 'optimal' algebraic  
accuracy

### Problem

Stop the iterative linear solver  
at 'optimal' iteration  $k$ ?

Save computations!

$k_{optimal}$	$k_{10^{-6} \text{ tolerance}}$	Matrix size
26	62	476820

Stopping test for MINRES, GMRES, and BICGSTAB( $\ell$ )