PyNosh Documentation

Release 0.2.2

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November 09, 2015

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CHAPTER 1

pynosh.modelevaluator_nls

Provide information around the nonlinear Schrödinger equations.

class `pynosh.modelevaluator_nls.`**`NlsModelEvaluator`**(*mesh, V=None, A=None, preconditioner_type='none', num_amg_cycles=inf*)

Bases: `object`

Nonlinear Schrödinger model evaluator class. Incorporates

- Nonlinear Schrödinger: $g = 1.0, V = 0.0, A = 0.0$.
- Gross–Pitaevskii: $g = 1.0$, V given, $A = 0.0$.
- Ginzburg–Landau: $g = 1.0, V = -1.0$, and some magnetic potential A.

`compute_f`(*x, mu, g*)

Computes the nonlinear Schrödinger residual

$$GP(\psi) = K\psi + (V + g|\psi|^2)\psi$$

`energy`(*psi*)

Compute the Gibbs free energy. Not really a norm, but a good measure for our purposes here.

`get_jacobian`(*x, mu, g*)

Returns a LinearOperator object that defines the matrix-vector multiplication scheme for the Jacobian operator as in

$$A\phi + B\phi^*$$

with

$$\begin{aligned} A &= K + I(V + g \cdot 2|\psi|^2), \\ B &= g \cdot diag(\psi^2). \end{aligned}$$

`get_jacobian_blocks`(*x, mu, g*)

Returns

$$\begin{aligned} A &= K + I(V + g \cdot 2|\psi|^2), \\ B &= g \cdot diag(\psi^2). \end{aligned}$$

`get_preconditioner`(*x, mu, g*)

Return the preconditioner.

get_preconditioner_inverse (*x*, *mu*, *g*)
Use AMG to invert M approximately.

inner_product (*phi0*, *phi1*)
The natural inner product of the problem.

CHAPTER 2

Indices and tables

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