

# Locally Conservative Discontinuous Petrov-Galerkin for Convection-Diffusion

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# A Summary of DPG

## Overview of Features

- Robust for singularly perturbed problems
- Stable in the preasymptotic regime
- Designed for adaptive mesh refinement

DPG is a minimum residual method:

$$u_h = \arg \min_{w_h \in U_h} \frac{1}{2} \|Bw_h - I\|_{V'}^2$$
$$\Updownarrow$$

$$b(u_h, R_V^{-1} B \delta u_h) = I(R_V^{-1} B \delta u_h) \quad \forall \delta u_h \in U_h$$

where  $v_{\delta u_h} := R_V^{-1} B \delta u_h$  are the **optimal test functions**.