Numerical treatment of Dirichlet boundary conditions in the finite element method

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For problems with Dirichlet boundary conditions, the boundary data are projected into a finite element space. There are various methods for doing this:

- L^2 projection,
- $H^{1/2}$ projection,
- Lagrange interpolation,
- Scott–Zhang interpolation,
- Carstensen interpolation,

which will be compared in the lecture. Variations arise when the data must satisfy compatibility conditions or when, as in the case of Dirichlet boundary control, the projector is of theoretical interest only but does not need to be implemented.

References:

[1] https://arxiv.org/abs/2604.11356

[2] https://arxiv.org/abs/2603.09507

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