

# libspace: Abstracting Away Function Space Discretizations

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# Chapter 1

## Finite Element Discretizations

### 1.1 Overview

### 1.2 DoF Representations of FE-Functions

#### 1.2.1 Representation

$$f_h(x) = \sum_{i=1}^{N_{dof-total}} f_i \phi_i(x) \quad (1.1)$$

#### 1.2.2 Approximating Continuous Functions

#### 1.2.3 Coarsening and Refining Representations

#### 1.2.4 Representing Potential Operators

#### 1.2.5 Integration and Inner Products

#### 1.2.6 Solving Partial Differential Equations

### 1.3 Point-Value Representations of Functions

#### 1.3.1 Approximating Continuous Functions

#### 1.3.2 Coarsening and Refining Representations

#### 1.3.3 Representing Potential Operators

#### 1.3.4 Integration and Inner Products

#### 1.3.5 Solving Partial Differential Equations