# C++ Template

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# Contents

# Abstract

**Little C++:**

- Mathematical notation for mesh.
- Explanation of template of C++
- Explanation for mesh
- Represent on of the code

# Introduction

**Template C++**

- Functional and Class templates
- How to write it
- Explanation of theory
- Explanation of code

**Reference**

https://www.math.colostate.edu/~bangerth/videos.676.12.html

# Basic concept

***Code base for Mesh*** ***Mathematical Notation looks like same in 1D and 2D***

Quadrature

$$A_{ij} \approx \sum_K \sum_{q=1}^{Q} J_K^{-1}(\hat{x}_q)\hat{\nabla}\hat{\varphi}_i(\hat{x}_q) \cdot J_K^{-1}(\hat{x}_q)\hat{\nabla}\hat{\varphi}_j(\hat{x}_q) \underbrace{|\det J_K(\hat{x}_q)| \; w_q}_{=:\mathrm{JxW}}$$

```
for (cell=begin; cell!=end; ++cell)
    apply d-dimensional quadrature formula
    to integrand on cell K
```

error indicator: $\eta_K^2 = \frac{h}{24}\left\|[\boldsymbol{n}\cdot\nabla u_h]\right\|_{\partial K}^2$

```
for (all cells)
    for (all faces of this cell)
        apply (d-1)-dimensional quadrature formula
        to jump term on this face
```

# Conclusions

- Code explanation
- Mathematical interpretation
- Code for building

# Thank You