Introduction

# Cxxxstrxxucture Coxxxtérisés par Imagerie

Xxxxx YYY

Ecole Centrale de Nantes





Directeur de thèse : xxx yyy Co-encadrants : xxx ddd

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Introduction

#### • unbiased mean values of homogenized properties

- smaller dispersions than classical homog extraction
  - much tighter bounds ( $[S_{\Sigma}^{app-1}(SUBC), C_{E}^{app}(KUBC)]$
  - for the case PERIODIC is not easy or impossible to to be applied
  - a cheaper computational cost than classical homogenization extraction but more accurate

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# Objective of This Work

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# Three-scale Strategies

Introduction

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#### Outline of Presentation

Introduction

- Image-based Homogenization
  - Computational Homogenization
  - X-FEM/Levelset for Boundary Value Problem
  - Validation Examples
  - Numerical Examples
- 2 Edge Effects
  - Determination of Sample Numbers
  - Existence of Edge Effect
  - Numerical Examples
- Three-scale Scheme
  - Three-scale
- 4 Conclusions

## Boundary Value Problem

# Various Numerical Strategies

# X-FEM/Levelset Modeling

#### Meshing Strategies

#### Calculation of Levelset

## Image Segmentation

## Model Assessment via Effective Properties

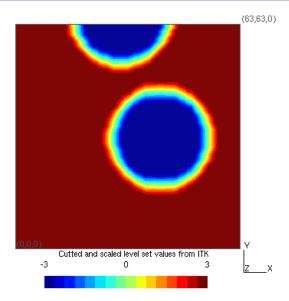
# Model Assessment via Analysis of Local Quantities

#### A Ceramic-metallic Composite Material

```
dfadsf}
dfasdfsdaf
dfsdafsda
dfasfsda
```

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#### A Cereal Solid Food



## **Concluding Remarks**

Edge Effects

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#### Random Subsampling Homogenization

- dfasdsa
- odfasdfsda

### Sample Numbers

#### sdfsdf

- sdfsadf
- dfsadfsa
- dfdasfsa
- 4 dfasdf

# Apparent Properties

#### Definition

sdfsdfsdf sdfsaf

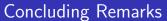
# Edge Effects

#### Subdomain Extraction Process

# Determination of Edge Effects Region

# Matrix-Fiber Example for $E_f/\overline{E}_m = 0.01$

#### Random Checkerboard



## **Concluding Remarks**

# Conclusions et Perspectives

#### Conclusions

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#### The remarkable advantage of subdomain extraction

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## Perspectives

# Thanks for Your Attention.

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