Inverse Identification of Mechanical Materials Properties Using the Integrated-DIC Technique

Lucas BREDER TEIXEIRA, Eric BLOND, Thomas SAYET, Jean GILLIBERT

Polytech Orléans – LaMé. 8 rue Léonard de Vinci, 45072 Orléans Cedex 2 - France

ATHOR EU MSCA ETN Refractory linings

MARIE CURIE ACTIONS

Advanced THermomechanical multiscale mOdelling of Refractory Linings

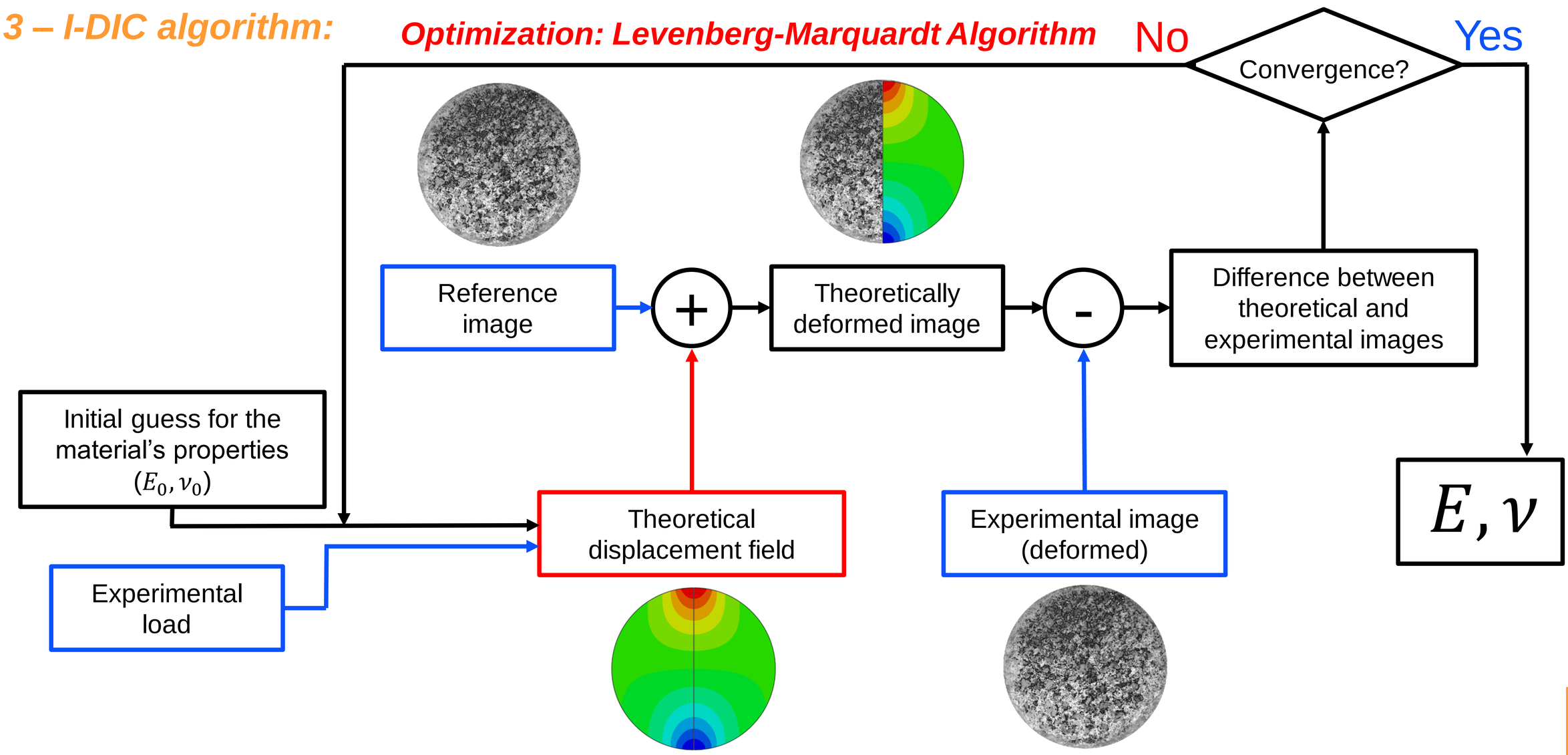
1 – Introduction:

- The modelling of **refractory materials** at high temperatures requires the determination of the most suitable **mathematical models**
- Moreover, accurate models tend to require **complicated testing** for the determination of the **materials' parameters**
- **Digital Image Correlation** techniques have been used to close the gap between complex materials' models and the determination of the required mechanical properties

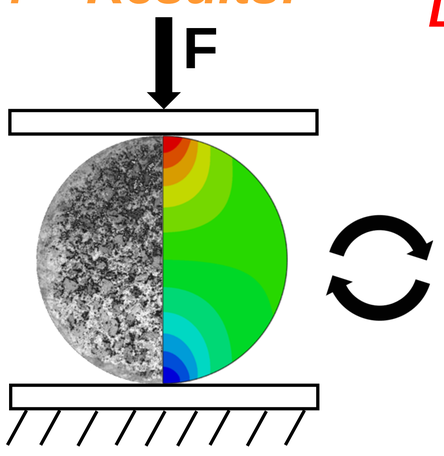
2 – Objectives:

- This work intends to apply the I-DIC technique to the determination of **mechanical properties of refractories**
- Especial emphasis will be given to their **primary and secondary creep** behaviour at **high temperatures**
- It's expected to fully characterize the materials (tension, compression and shear) using a **reduced number of tests**, making use of the Brazilian test

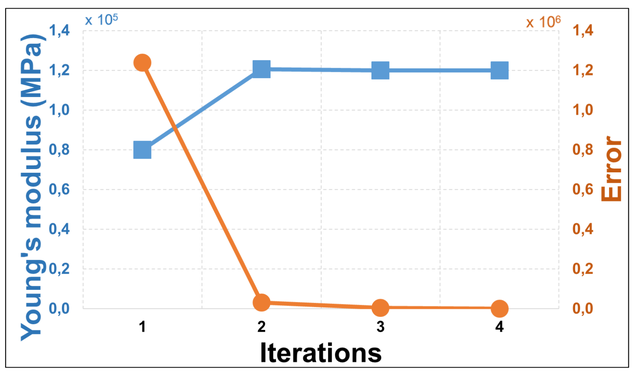
3 – I-DIC algorithm:



4 – Results:



Linear Elastic Isotropic Model



5 – Conclusions:

- The **I-DIC technique** is a convenient option to perform **inverse identifications**, and the robustness of the **optimization algorithm** related to it plays a decisive role in the obtained results
- For future works, the challenges of the **high temperature I-DIC** will be addressed, and the development of **innovative techniques** related to the images' quality is a priority

ESR Position 09

Lucas BREDER TEIXEIRA

Early Stage Researcher

mail: lucas.breder-teixeira@univ-orleans.fr

Supervisors & University

Eric BLOND, Thomas SAYET, Jean GILLIBERT

UNIVERSITE D'ORLEANS

LaMé Laboratoire de Mécanique Gabriel Lamé

Acknowledgments

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement no.764987

Consortium of 15 European Partners

RWTH AACHEN UNIVERSITY · AGH · MONTAN UNIVERSITÄT · Université de Limoges · Universidade do Minho · UNIVERSITE D'ORLEANS · Universidade de Coimbra · fiRe · alteo · IMERYS TRANSFORM TO PERFORM · Pyrotek · RHI MAGNESITA · SAINT-GOBAIN · TATA STEEL · SAFRAN