

IMFD RESEARCH SEMINAR PRESENTATION DR. MAYU MURAMATSU, KEIO UNIVERSITY

Hosted by Prof. Bernhard Eidel, · Chair of Micro Mechanics & Multiscale Materials Modeling

A MULTISCALE METHOD COUPLING MD AND FEM FOR INVESTIGATION ON ATOMISTIC-SCALE DEFORMATION MECHANISMS UNDER CONTINUUM-SCALE DEFORMATION

PRESENTER



Dr. Mayu Muramatsu

Keio University
Department of Mechanical Engineering

✉ Muramatsu@mech.keio.ac.jp
🌐 <https://muramatsu.mech.keio.ac.jp/>

Tuesday, May 20, 2025
14:30 – 16:00

Lecture hall : WEI-1051
Julius-Weisbach-Bau
Lampadiusstr. 4, Freiberg

BIOGRAPHY

- 2011 Ph.D
Keio University, Department of Mechanical Engineering
- 2012-2013 Researcher
National Institute of Advanced Industrial Science and Technology
- 2014-2017 Assistant Professor
Tohoku University
- 2018-Present Senior Assistant Professor (2022- Associate Professor)
Keio University, PI

ABSTRACT

The objective of this study is to develop a multiscale bridging method for investigating nanocrystalline metals based on macroscale deformation. To achieve this objective, we propose a hierarchical multiscale computational method that enables scale bridging to atomic-scale models within a finite element model. In this method, atomic-scale nanocrystal models are associated with finite element integration points and assumed to deform based on macroscale deformation. Nanocrystalline aluminum was selected for the validation of the multiscale method. Finite element method and molecular dynamics methods were used for continuous-scale and atomic-scale simulations, respectively. The concept of the Cauchy-Bourne rule was utilized to transfer deformation information from the continuous scale to the atomic scale. The results of the analysis investigated changes in microstructure due to differences in loading conditions. Additionally, a method to reduce simulation costs was also investigated.

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