Research topics for graduate students for 2024

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Acceptable course(s)

- Master's Degree

Research Topics

The topics of research for are the microstructure control of bulk metallic materials using hot rolling [1], the plastic anisotropy [2], and the application of plasticity theory to the residual stress control [3].

1. Microstructure control of bulk metallic materials

Simultaneous optimization of mechanical properties and geometry of formed products strongly requires from the past. We have investigated the acquisition methods for the evolution of microstructures by using the hot compression testing machine [1]. Materials with duplex phases will be the coming targets for the research in model innovation and experiments.

2. Plastic anisotropy

Plastic anisotropy composes the main field of research in plasticity theory but anisotropy in stress and anisotropy in deformation are not well distinguished in the past investigation. We focus on the non-associated flow rule to express the plastic anisotropy, and its application to the simulation of cold stamping [2].

3. Application of plasticity theory to the residual stress control

Mixed hardening theory must be implemented to make an accurate prediction of sheet after tension leveling [3]. We enlarge our focus on the wider forming area to enable the prediction of residual stress.

Articles Related to Research Topics

[1] S. Ding, S.A. Khan and Jun Yanagimoto: Flow behavior and dynamic recrystallization mechanism of A5083 aluminum alloys with different initial microstructures during hot compression, *Materials Science & Engineering A*, Vol.787(2020-6) 139522. [DOI:10.1016/j.msea.2020.139522]

[2] B. Wu, H. Wang, T. Taylor and J. Yanagimoto: A non-associated constitutive model considering anisotropic hardening for orthotropic anisotropic materials in sheet metal forming, *International Journal of Mechanical Sciences*, (2020) 1-17. [DOI: 10.1016/j.ijmecsci.2019.105320]

[3] H. Wang, B. Wu, T. Higuchi and J. Yanagimoto: Tension leveling using finite element analysis with different constitutive relations, *ISIJ International*, 60-6 (2020) 1273–1283. [DOI:10.2355/isijinternational.ISIJINT-2019-620]

Lab. Web page: https://www.cem.t.u-tokyo.ac.jp/?lang=en