

Description of plastic deformation trajectories in face-centered-cubic metals using recurrent neural networks

Fomin E V[®] and Mayer A E

Chelyabinsk State University, Bratiev Kashirinykh Street 129, Chelyabinsk 454001, Russia

[®] fomin33312@gmail.com

The deformation pre-history determines the current state of matter in the plastic deformation region of materials, so such a process is a dynamic system [1]. Existing research shows that dynamic processes can be approximated with high accuracy by deep recurrent neural networks [2]. In this paper, a deep recurrent neural network model is trained on the basis of molecular dynamics simulation data of several deformation trajectories of pure aluminium crystal [3].

The work was funded by the Russian Science Foundation (project No. 20-11-20153-P, <https://rscf.ru/en/project/23-11-45024/>).

- [1] Gorji M B, Mozaffar M, Heidenreich J N, Cao J and Mohr D 2020 *J. Mech. Phys. Solids* **143** 103972
- [2] Yu W, Gonzalez J and Li X 2021 *Neurocomputing* **422** 85–94
- [3] Plimpton S 1995 *J. Comput. Phys.* **117** 1–19