THE UNIVERSITY OF HONG KONG

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR

Online

Title: **An overview of recent progresses on the theory of dislocation density fields kinematics**

Speaker: **Mr. Alireza Kalaei (MPhil candidate)**
Department of Mechanical Engineering
The University of Hong Kong
Hong Kong

Date: **30 April, 2021 (Friday)**

Time: **3:00 p.m.**

Zoom Link: **1) Link to join the meeting:**

https://hku.zoom.us/j/4013084652?pwd=b0JUR3N2ODhxazhrc0laYUdxVVE3dz09

2) Meeting ID: 401 308 4652

3) Password: 13761376

Abstract:
There are different types of crystal defects e.g., point, line, and planar defects in crystal structures which always affect various properties of metals. One of the most important defects which have a significant role in the plastic deformation of metals is dislocations. The motion and interaction of these line defects are one of the considerable and the most important mechanism of plastic deformation in metals. Thus, the Kinematics and Dynamics modeling of dislocations motion grabbed attention during recent decades, magnificently. Dislocations can be considered and simulated based on various scales or sight e.g., atomistic, discrete, and density-based. The main drawback of atomistic and discrete

consideration of dislocations is the tremendous amount of required computation leading to the availability of these two scales just for a very short period and small systems, while on the latter one, the most extensive sight among the sights, it would be feasible to simulate dislocations on a larger scale and for a longer period. By the implantation of the mentioned density-based sight, it would be possible to understand and predict some phenomena corresponding to collective motion of dislocations like strain localization, and hardening. Moreover, by developing, and utilization of an effective continuous model for dislocations, it would be possible to bridge between a continuous model of dislocations and Crystal plasticity as the commonly used model for simulation of metals' deformation on the macro scale. So, developing and focusing on the continuous modeling of dislocations would be a critical and effective way for multiscale modeling between meso-scale and macro-scale of deformation, and elimination of phenomenological coefficients on macro-scale.

In this presentation, there would be a short review of developed models for field dislocations density kinematics, firstly. Then, a very recent developed function for 'all dislocation density field kinematics' will be introduced. Finally, some preliminary results of simulations by the function will be presented.

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. A.H.W. Ngan at 3917 7900.

Research area: Advanced Materials