

# Dislocation Dynamics simulations to study plastic deformation

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## Overview

Dislocations are line defects that nucleate and grow during plastic deformation of all crystalline metals and alloys. It is the behaviour of dislocations – their motion and interactions with each other (and other defects) – that determine the behavior of materials undergoing plastic deformation. Dislocation dynamics simulations are used to simulate the behavior of dislocations under an imposed load and specified boundary conditions. These simulations incorporate a complete description of the crystallography of dislocations and their stress/strain fields, and hence do not need any assumptions about how dislocations interact with each other. As a result DD simulations are better than finite element type simulations at capturing the effect of crystallographic orientation, and of dislocation interactions on strength and strain hardening in materials.

Course participants will learn these topics through lectures and hands-on lab sessions

<b>Modules</b>	<b>19 lectures and 16 hands-on tutorial sessions: January 15<sup>th</sup> to January 25<sup>th</sup> 2018</b> <b>Number of participants for the course will be limited to fifty.</b>
<b>You Should Attend If...</b>	<ul style="list-style-type: none"><li>• You are working on problems related to plastic deformation.</li><li>• You are an engineer or researcher from materials science and metallurgical industry (such as Tata Steel, JSW, GE), and from research centres such as BARC and DMRL.</li><li>• You are a student at post-graduate level (MTech/PhD) or early stage researchers (post-docs and faculty) from reputed academic or technical institutions.</li></ul>
<b>Fees</b>	The participation fees for taking the course is as follows: <b>Participants from abroad : US \$500</b> <b>Industry/ Research Organizations: Rs. 30000</b> <b>Academic Institutions/ Faculty/ NGO: Rs. 8000</b> <b>Students &amp; Research Scholars: Rs. 3000</b> The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

## The Faculty



**Prof. Marc Fivel** is a CNRS Research Professor at SIMaP / Univ. Grenoble Alpes, Grenoble, France. Prof. Fivel has been working on Discrete dislocation dynamics simulations: application to multiscale modelling of crystal plasticity for the past few years. Details of the program they have developed can be found at [www.numodis.com](http://www.numodis.com).



**Prof. Prita Pant** is a faculty member in the Department of Metallurgical Engineering and Materials Science. Her primary research interest lies in developing an understanding of the effect of microstructure on the mechanical behavior of metals and alloys. She uses a combination of DD and MD simulations and experiments for her studies.

## Course Co-ordinator

**Prof. Prita Pant**

Phone: 022 2576 7616

E-mail: [prita pant@iitb.ac.in](mailto:prita pant@iitb.ac.in)

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<http://www.gian.iitkgp.ac.in/GREGN>

**GIAN Short Term Course on**

**Dislocation Dynamics simulations to study  
plastic deformation**

**15 – 25 January 2018**

**Registration Form**

Name(in block letters): \_\_\_\_\_  
\_\_\_\_\_

Qualification: \_\_\_\_\_

Designation: \_\_\_\_\_

Organization: \_\_\_\_\_

Mailing Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Mobile: \_\_\_\_\_

Fax: \_\_\_\_\_

Email: \_\_\_\_\_

Payment: Rs. \_\_\_\_\_

DD No.: \_\_\_\_\_ Dt: \_\_\_\_\_

(DD in favour of "Registrar, IIT Bombay – CEP a/c")

**Or NEFT/ RTGS**

(Please furnish the foll. details if NEFT/RTGS)

Name of A/c Holder

UTR NO./Transaction ID

Name of Bank & Branch

Date of Payment

Amount

IIT Guest House/ Hostel accommodation  
required: YES / NO

Signature of Applicant: \_\_\_\_\_

Date:

**Venue for Classes**

Classes will be held in the computational lab of the Department of Metallurgical Engineering and Materials Science, IIT Bombay.

**Lecture Notes**

To fully realize the objectives of the course, the lecture notes will be made available at the time of registration at IIT Bombay.

**Date & Time of Registration:**

15<sup>th</sup> January 2018, 9.00 AM at the Engineering and Materials Science, IIT Bombay.

**COURSE FEE**

**Participants from abroad: US \$500/-**

**Industry/ Research Organizations: Rs. 30000/-**

**Academic Institutions/ Faculty/ NGO: Rs. 8000/-**

**Students & Research Scholars: Rs. 3000/-**

The above fees include all instructional materials, computer use for tutorials and assignments, laboratory usage charges, free internet facility. Subject to availability, the participants will be provided with accommodation on payment basis.

The fees may be paid by demand draft drawn in favour of "**The Registrar, IIT Bombay - CEP Account**".

**Or through NEFT/RTGS:**

Name of beneficiary: Registrar, IIT Bombay

Account name: IIT Main Account

Name of Bank: State Bank of India, IIT Powai

Beneficiary A/C No: 00000010725729128

Bank MICR Code: 400002034

IFSC Code: SBIN0001109

SWIFT Code: SBININBB519