Multi Scale Modeling of Sheet Metal Forming

December 3-7, 2019

Overview

Industries, to reduce the "concept to market time" have gone for virtual fabrication to remain competitive among their peers and to produce quality and reliable products. Compared to the usual design/test/redesign cycles, the computer-based testing of a virtual prototype reduces dramatically the research and development time. In the metal forming industry, an important part of the virtual factory relies on the numerical simulation of sheet metal forming processes by finite element (FE) programs. The success of an FE simulation depends largely on the accuracy of the constitutive model describing the plastic behaviour of the sheet.

Recent advances in the modeling of metals include the modeling of structural in homogeneities, damage, porosity, twinning/untwining, non-local and second-order effects. Almost all of the materials used in the present day metal forming industry are anisotropic showing both as-received anisotropy and evolving anisotropy related to plastic deformation processes. Plastic anisotropy can be most easily explained by the microstructure of the material.

This course covers the modelling aspects of metal forming processes with special emphasize to anisotrophy, constitutive relations and multi scale modelling.

Objectives

The primary objectives of the course are as follows:

i) Exposing participants to the fundamentals of formability of materials,
ii) Enabling the participants to perform simulation studies by using multi scale modeling techniques and to solve industrial problems using such modeling techniques,
iii) Providing exposure to practical problems and their solutions, through case studies and laboratory sessions in formability studies,
iv) Assisting the participants to develop constitutive equations and to use them to model metal forming processes.

Modules	A: **Formability of materials I Defects in sheet metals forming;Forming Limit Diagrams(FLD)** : December 3, 2019 B: **Yield criteria - Isotropic yield criteria and Anisotropic yield criteria** : December 4, 2019 C: **Advanced anisotropic yield criteria: BBC, Barlat, Cazacu, Vegter yield criteria** : December 5, 2019 D: **Multiscale modelling I and II** - Void growth modeling : December 6, 2019 E: **Effect of the constitutive equations on the accuracy of simulation** : December 7, 2019
You Should Attend If…	Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories. Students at all levels (B.Tech/MSc/M.Tech/Ph.D) or Faculty from reputed academic and technical institutions.
Fees	**For Students from India:** Participation without grading: Rs. 500 /- Participation with grading : Rs.1000/- **For Faculty/Scientists/Industry from India** Faculty (Internal & External) & Scientists from R&D Labs: Rs. 3000/- Persons working in Industry / Consultancy firms : Rs. 4000/- **For Participants from abroad** Students : USD 50 Faculty/Scientists/Persons from Industry & Consultancy firms : USD 100 The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility and working Lunch. The participants will be provided with accommodation on payment basis.

The Faculty

1. Prof Dorel Banabic (Foreign Faculty)

Dr Dorel Banabic is a **Professor of Manufacturing Engineering** at Technical University of Cluj-Napoca and also the **Co-founder** and company advisor in research and education of **Fortech**, a software development concern based at Cluj-Napoca. Prof Dorel Banabic is a renowned researcher in sheet metal forming. Professor Banabic developed some models to describe the anisotropic behavior of sheet metals used in the AutoForm commercial FE code (used by more than 95% of the automotive companies from around the world). He is Director of the Research Center on Sheet Metal Forming (CERTETA) at the Technical University of Cluj-Napoca.

Between 2000 and 2005, Professor Banabic held a part time position at the Institute of Metal Forming Technology at Stuttgart University. He is a Member of the Romanian Academy, the Romanian Academy for Technical Sciences and the International Academy for Production Engineering (CIRP). He is currently President of the European Scientific Association for Material Forming.

2. **Dr. M J Davidson**, Department of Mechanical Engineering, NIT, Warangal, India **(Host Faculty)**

3. **Dr. Kanmani Subbu,** Department of Mechanical Engineering, IIT Palakkad, India **(Host Faculty)**

Registration in GIAN Portal

Participants interested in attending GIAN courses must register themselves in GIAN portal, which is a onetime affair. (http://www.gian.iitkgp.ac.in/GREGN/index) Once registered in the portal, an applicant will be able to apply for any number of GIAN courses as and when necessary. One time non-refundable fee of Rs. 500/- is to be paid. Mere registration in the portal will not ensure participation in the course. The course coordinator will shortlist the participants based on qualifying criteria. Shortlisted candidates must pay the course participation fee as mentioned in the brochure separately to the account mentioned below to confirm his/her seat.

Steps to be followed for Portal and Course Registrations.

1. Go to weblink mentioned above and register in GIAN portal.
2. Fill up the registration form.
3. Select courses
4. Pay Rs 500/- (non-refundable) through online payment Gateway of GIAN.
5. Pay the Course Registration fee (Only shortlisted candidates) through online mode to GIAN NITW Account mentioned below.

After paying course registration fee, Payment details (Online transaction number and date of transfer) must be mailed to the coordinator (jd@nitw.ac.in).

Account Name	**GIAN NITW**
Account No	**62447453600**
Branch	**SBI, NIT Branch, Warangal**
IFSC code	**SBIN0020149**

Course coordinators

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