



Doctoral school SPIM - science course 2015-2016

Acronym : SPIM-GHAAM	Green's function and Hamilton's principles Applied to to the Modelling of MEMS
Required prior knowledge	Understanding and using divergence theorem, basic matrix analysis, using basic computer tools
Form of examination	Mixed : Q/A game after lectures and one short report on practice problems
Keywords	
Learning outcomes	What are the differences between Finite Element and Boundary Elements/Integral Methods Basic techniques of numerical modeling: interpolation, integration Understanding the key-features of MicroElectroMechanicalSystems behavior At the end of the course, the PhD student should be able to write by himself small programs in Matlab-like languages
Content	4 lectures of 90 minutes each + 2 sessions of training (2x2 hours each) in a computer-equipped class-room Lecture 1: Behavior laws and balance equation for elasticity, electrostatics, and piezoelectricity, Equivalence between Hamilton's principle and the local equations of elasticity. Hamilton's formulation for Lecture 2: How to build a FEA problem through nodal-interpolation techniques and matrix assembly Lecture 3: Green's function in electrostatics and structural mechanics. The charge density problem. Lecture 4: What is a MEMS ? The pull-in effect. Training 1: Computing the static flexure of a bar by FEA, modeling the eigen-frequencies of longitudinal modes of a bar by FEA Training 2: Computing the static flexure of a bar or a disk by FEA - Computing the charge density in a 2D capacitor by BIM method with help of Green's function
Instructor(s)	DULMET Bernard (PR, FEMTO-ST Temps Fréquence)
Number of participants	Between 8 and 20 participants
Hours	14h (Lecture cours: 6h + Exercices: 8h + Pract. Work, TP-projet:0h)
Calendar number of sessions, dates and times	
Location (room, building, adress, city)	
Registration Procedures	by email to formations.doctorales@univ-fcomte.fr Your message MUST specify your Full name, graduate school, research topic, the style of training and / the sessions you wish to register. If you are outside the UFC also indicate your university and the name of your manager and your home university. Registrations will be taken into account until three weeks before the date of formation within the limits of available seats. You will receive an acknowledgment of your request, then a notice by email approximately one week prior to training. WARNING: The courses are expected to be completed by registering, you agree to participate. If you are exceptionally ultimately unable to participate, be sure to inform as soon as possible.
Comments	Participants who have validated this course (registration at each session and validation rules as above) and who have completed the online survey will receive a certificate via email in 4 weeks following the training. This training is open to doctoral students from other graduate schools. This course will be taught in English or French (depending on age) with course materials in English

Les inscriptions seront ouvertes lorsque les dates seront fixées