

Master's program :
Technological Innovation

**Multiscales and Multiphysics Modeling
of Materials and Structures**

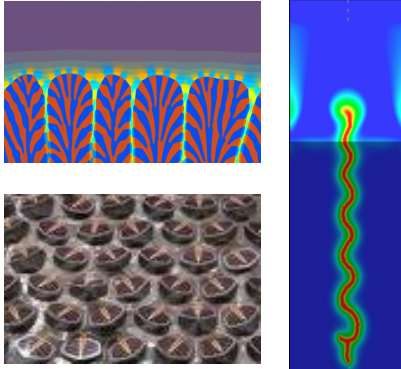
(subject to habilitation)

Academic year 2011-2012

Program directors :

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Presentation

- Second-year multidisciplinary program (Mechanics and Physics of Solids, Applied Mathematics)
- Courses during Semester S3 (september-february)
- Six-month internship during Semester S4 in France or abroad
- All courses are taught in English at Ecole Polytechnique
- The program is based on the research resources of 3 laboratories of Ecole Polytechnique (LMS, PMC, CMAP)

Expected benefits

- Fundamental understanding of the multi-physical behavior of materials at all space and time scales
- Mastering of modern modeling methods
- Training by and for a research activity

Employment opportunities

- Career in the industrial world (with or without a PhD)
- Career in the academic world after a PhD

Program of courses

| ECTS | Title | Instructor(s) | Affiliation |
|------|---|---|-------------------------------------|
| 4 | Multiscale modeling of materials | M. Plapp | EP/PMC |
| 4 | Modeling of heterogeneous materials and structures, application to composites | M. Bornert H. Maitournam | ENPC/Navier EP/LMS |
| 4 | Active materials: solids with coupled electromagnetic and thermomechanical properties | N. Triantafyllidis | EP/LMS |
| 3 | Microscopic nature of dissipative behavior: from phase transitions to molecular motors | L. Truskinovsky | EP/LMS |
| 3 | Homogenization | G. Allaire | EP/CMAP |
| 3 | Thermomechanical behavior of materials and structures at different time scales | A. Constantinescu | EP/LMS |
| 3 | Pattern formation mechanisms: how do the microstructures arise | H. Henry | EP/PMC |
| 3 | Disordered media and experimental tools | M. Bornert P. Levitz | ENPC/Navier EP/PMC |
| (3) | Sustainable Construction (this course can replace one of the courses above) | H. Teulon | EP/Eco |
| (3) | One course of the following courses of the Master's program TACS can replace one of the courses above | (i) J.-J. Marigo (ii) P. Le Tallec (iii) C. Stolz (iv) Z. Moumni | EP/LMS EP/LMS EP/LMS ENSTA |