

**Call for application for research scholarships
for post-graduate international candidates**

RESEARCH PROJECT N. 64

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| Title |
| Mathematical multi-scale modeling of biological tissues. |
| Scientific responsible (name, surname, role) |
| Alfio Grillo, Scientific Advisor (alfio.grillo@polito.it) |
| Short description of the research activity (max 250 words) |
| Multi-scale composites organized across two or more length scales are often encountered in nature, as well as in artificial materials designed to optimize specific properties. Relevant applications involving these kind of systems include, but are not limited to, biomechanics of soft and hard tissues, poro-elasticity and nano-medicine. Multi-scale modeling via suitable homogenization techniques is of crucial importance in the analysis of composite materials. It can offer a deeper understanding on how to modify the microstructural arrangement of the inner scales constituents to achieve the optimal design of artificial constructs. The aim of the present project is to investigate the effective properties of hierarchical composites at the different scales by proposing a formal asymptotic approach taking into account the multiple-scales nature of the physical problem. The approach becomes an appropriate instrument in the study of biomechanical and engineering applications where several length scales are present and represents a step towards computationally feasible multi-scale modeling of complex hierarchical materials. |
| Specific requirements (experiences, skills) |
| <ul style="list-style-type: none">- Homogenization- Continuum Mechanics- Numerical methods |
| Website of the research group (if any) |
| http://www.disma.polito.it/en/research/research_groups/models_and_methods_in_mathematical_physics |
| Keywords (min 3, max 6) |
| Multiple scales, homogenization, effective properties, hierarchical composites, biological tissues |
| Research Area (max 1) |

Mathematics