Luca Di Stasio

Early Stage Researcher

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Background

I am currently employed as a full-time PhD candidate in Polymeric Composite Materials at the Division of Materials Science, Department of Engineering Sciences and Mathematics, Luleå tekniska universitet (LTU) in Luleå, Sweden. I currently teach in 4 graduate-level courses offered in the subject of Polymeric Composite Materials. The courses are offered as part of the LTU-offered Master programme in Composite Materials and the international joint Master programmes in Materials Science and Engineering EEIGM/EUSMAT (European School of Materials Science and Engineering) and AMASE (Advanced Materials Science and Engineering). Previously, I taught at the École Européenne d'Ingénieurs en Génie des Matériaux (EEIGM) in Nancy, France in undergraduate- and graduate-level courses in Solid Mechanics, Viscoelasticity, Linear Elastic Fracture Mechanics, Mechanics of Composite Materials. I also contribute to the research activities of the Polymeric Composite Materials subject at LTU, working on integrated computational and experimental mechanics of polymers and polymer composites with a focus on fatigue, fracture and damage (see my Research Statement for more details). In addition, I am involved in the supervision of graduate students in the context of Master theses and project courses. I am actively involved in the continuous improvement of teaching practices in the subject of Polymeric Composite Materials by proposing new experimental activities for students (composites repair laboratory, bi-axial strain gauge measurements) as well as improving the virtual learning space of the courses offered in the subject. Furthermore, I actively contribute to the pedagogical research in Higher Education; currently I am working on a contribution (article and oral presentation) to the upcoming *Development Conference for Swedish Engineering Education 2019*.

Higher Education Courses and Study Programmes

Subject Related Courses
As detailed in my resumé, I have received a BSc in Aerospace Engineering (2010) from Politecnico di Milano (Milan, Italy), a MSc in Mechanical Engineering (2012) from Drexel University (Philadelphia, USA), a MSc in Space

Experience of Teaching and Supervision within Higher Education

In the short- to medium-term perspective, I am currently laying the groundwork for several future works: derivation of the vectorial VCCT from Eshelby's elastic energy-momentum tensor and proposal of a new mode-partitioning strategy based on eigenvalue analysis; investigation of fiber/matrix debonding with concurrent non-linear (viscoelastic, viscoplastic) behavior of the surrounding matrix; 3D modeling of fiber/matrix debonding; 3D imaging of fiber/matrix debonding using in-situ micro-tomography; development of an image analysis algorithm for automated stress-free temperature identification through curvature measurements of asymmetric laminates and its implementation with a temperature feedback loop on low-cost hardware (e.g. android handset, Arduino, Raspberry Pi); creation and real-time update of specimens' digital twins through low-cost hardware (Kinect for Xbox); application of Bayesian inference to the prediction of elastic, viscoelastic, viscoplastic, failure and fracture toughness properties.

In the long term, I envision the development of the distributed, de-centralized, remotely-controlled, integrated laboratory for composite science and engineering: a set of fully automated laboratories and high-performance computing clusters connected together by a decentralized network (peer-to-peer) and accessible through an online platform, to allow collaborative projects on integrated computational-experimental analysis and design of materials between parties located around the globe.