https://stm.uniroma3.it/?post_type=jobs&p=5888

Eigenstrain-Based Modelling and Topological Optimisation of Residually Stressed Nano-Architected Materials

Description

This PhD project will focus on the development and application of computational models based on the Eigenstrain theory to analyse and optimise the mechanical behaviour of nano-architected metamaterials coated with residual-stress-controlled thin films. These metamaterials, manufactured via advanced 3D micro-fabrication and coated using multilayer ceramic films, exhibit surface- and interface-dominated mechanical responses that are strongly affected by residual stress distributions.

The candidate will develop inverse modelling tools based on the Eigenstrain approach and Finite Element Methods (FEM) to reconstruct internal stress fields from high-resolution experimental measurements (e.g., FIB-DIC and nanoindentation data), and to predict the mechanical response under different loading and defect conditions. Special attention will be given to the integration of genetic algorithm-based optimisation strategies for the topological re-design of unit cells, trusses, and node geometries to minimise stress concentrations and enhance mechanical robustness.

The research will be conducted in close synergy with experimental teams, providing modelling support and guidance for material design and validation. This work will contribute to the definition of novel design rules for next-generation architected materials, where interface geometry, coating architecture, and stress state are treated as active tuning parameters for performance.

Hiring organization
Università degli Studi Roma Tre

Employment Type
Full-time

Beginning of employment
01/12/2025

Duration of employment
3 years

Job Location
Via Vito Volterra, 62, 00146, Rome, Latium, Italy

Base Salary
€ 1460

Date posted
4 Giugno 2025

Valid through
13.07.2025