

Séminaire du laboratoire PIMM

Vendredi 14 mai 2021 à 13h30 sur Teams

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présentera dans le cadre du séminaire ses travaux intitulés :

Direct microstructure design by additive manufacturing – Prospects in 3D- and 4D-printing

It is well known that additive manufacturing (AM), also referred to as 3D-printing, allows for realization of components of unprecedented geometrical complexity. Focusing on the materials processed by AM, numerous studies have revealed unique microstructures and properties. Due to the characteristics being inherent to the processes employed, i.e. rapid solidification and intrinsic heat treatment, novel materials can be realized. By appropriate choice of process parameters even direct microstructure design is possible. In case microstructures are different in given volumes of a component, locally adapted properties can be realized straightforward. At this point AM techniques clearly offer significant advantageous in direct comparison to their conventionally processed counterparts. However, in AM geometry and microstructure of a given material are established simultaneously. Thus, in-depth knowledge on process-geometry-microstructure-property relations is crucially needed to realize components being characterized by superior functional and structural performance.

The present paper will introduce concepts and prospects related to AM of metallic materials. Materials in structural applications can benefit from direct microstructure design. Examples will be presented including integration of copy protection markers as well as areas allowing for crack arrest. Furthermore, the approaches introduced will be transferred to the field of functional materials to extend the approach to 4D-printing. Here, metallic shape memory alloys will be in focus. Finally, promising pathways toward the design of novel materials realized by AM will be highlighted.