

Additive Manufacturing: modeling and computational challenges!!

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Additive Manufacturing (AM) – also known as 3D printing – is taking off in many industrial processes. In particular, powder bed fusion for metal manufacturing has definitively changed the way of prototyping metal parts but also plastic 3D printing is changing many approaches in modern engineering.

However, AM is a complex physical process, involving different phenomena, e.g., heat conduction, phase change, surface change, and residual stress rising; accordingly, it is a complex coupled thermo-mechanical problem and simulation is fundamental to predict temperature distribution and stresses during and after the printing process.

After a general introduction to the technology and to possible applications, the presentation will focus on some new approaches to describe the complex physics occurring during the manufacturing process as well as on optimization problems associated to the freedom which is possible thanks to additive manufacturing. The presentation will try to highlight unresolved issues and open possible research directions.