Physics-informed modeling of additive manufacturing

Position Description

Applications are invited for PhD studentships starting in September 2023. It is suitable for well-qualified students who have (or expect to obtain) a first-class degree in engineering (B.S./M.S. in Mechanical, Industrial, Materials Science, or Biomedical), physics or other relevant subject. US Citizenship or US permanent residency is preferred. The funding will be in the combined form of teaching assistantship and research assistantship. Fellowship funding may also be available for exceptional applicants (GPA >3.75). Self-funded applicants are also welcome.

The candidates should have expertise and experience in at least one of the following areas: metal additive manufacturing, biomanufacturing, process monitoring, process optimization, advanced sensors and data analytics, statistical learning, metallurgy, heat treatments, materials characterization, computer-aided design, and multi-scale finite element modeling. Minimum qualifications are; excellent oral and written communication skills, excellent programming skills, experience with machine learning algorithms. Self-motivated individuals with a strong work ethic are encouraged to apply. Some experience of numerical modeling is desirable, as is knowledge of Matlab or Python.

Research Description

Our research relates to physics-informed fundamental process understanding and control in the additive manufacture of metals and other materials, including fused filament fabrication, directed-energy deposition, wire-arc, and powder-bed techniques. We also work with biomaterials and 3D bioprinting. Multiphysics modeling, validated by experiments, is enabling us to understand the complex interactions between energy source, material, process and the machine. The aim of this research is to extend the scope of our models to provide further insight for process planning and scaling-up for cost-effective high-quality production. The research will be supervised by Prof. Tugrul Ozel (coewww.rutgers.edu/marl) and will involve close collaboration with Industry and Government Laboratories, and manufacturers of fused filament method, bioprinting, metal wire-arc, directed-energy deposition, or powder bed additive layer manufacturing equipment.

To apply please email your CV and the names and addresses of two academic referees to ozel@rutgers.edu

References:

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