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### What is inside AM fabricated parts? the nature of residual stresses and shape distortion

Additive Manufacturing (AM) technologies are an exciting area of the modern industrial revolution and have applications in instrumentation, engineering, medicine, electronics, aerospace industry, and other fields. They include stereolithography, electrolytic deposition, thermal and laser-based 3D printing, 3D-IC fabrication technologies, etc. and are booming nowadays owing to their ability to fabricate products with unique characteristics that cannot be made with traditional fabrication techniques. AM enables cost-effective production of customized geometry and parts by direct fabrication from 3D data and mathematical models. However, to further the progress in the emerging area and empower scientists, engineers, and designers to fully implement the novel processes' capabilities, there is a need for a systematic study of mechanical analysis for AM technologies. Despite much progress in the area of AM technologies, problems of mechanical design and analysis for AM fabricated parts yet remain to be solved. So far, three main problems can be isolated: (i) the onset of residual stresses, which inevitably occur in the manufacturing process and can lead to failure of the parts, (ii) the distortion of the final shape of AM fabricated parts, and (iii) the development of technical and technological solutions aimed at improving existing AM technologies and creating new ones. We propose a fundamental approach for the modeling of surface growth of solids, which effectively describes the deformation processes in AM fabricated parts, as well as analytical and numerical methods for its implementation.

### Biography

Alexander V Manzhirov is a well-recognized scientist working in the field of Mechanics And Applied Mathematics. Currently he is the Deputy Director of the Ishlinsky Institute for Problems in Mechanics of the Russian Academy of Sciences and Head of the Department for Modeling in Solid Mechanics at the same institute. He is the author of more than 250 scientific publications, including 16 books and 4 textbooks. His main scientific activities concern mechanics of growing solids, additive manufacturing technologies, contact mechanics and tribology, viscoelasticity and creep theory. He is also universally known as an author of the world's first fundamental handbooks on integral equations. He is mainly interested in the fundamentals of mechanical analysis for AM fabricated parts.

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