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Getting in contact

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- Choose your topic

- Send relevant documents to contact person
  - application letter
  - curriculum vitae
  - certificates and current studies

- Wait for response
Simulation of LMJ Ablation

- Drilling of large aspect ratio holes by LaserMicroJet©-technology
- Identification and analysis of dominant physical effects limiting the achievable aspect ratio

Tasks:
- Modeling and simulation of jet stability
- Analysis of drilling strategies

Focus:
- Fluid dynamics
- C++, OpenFOAM

Contact: Torsten Hermanns – 0241/8906-8763 – torsten.hermanns@ilt.fraunhofer.de
Simulation of Laser Hybrid Joining

- Joining of metals and fiber reinforced plastics in lightweight applications
- Identification and analysis of process properties influencing the resulting bonding strength

**Tasks:**
- Simulation of laser structuring
- Simulation of mechanical behavior

**Focus:**
- Laser-matter interaction, structure mechanics
- C++, Abaqus, Mathematica etc.

Contact: Torsten Hermanns – 0241/8906-8763 – torsten.hermanns@ilt.fraunhofer.de
Simulation of USP Glass Ablation

- Machining of wide band gap materials using ultra short laser pulses
- Reduction of process defects for high mechanical and thermal load-bearing and high optical quality

**Tasks:**
- Model development
- Analysis of defect mechanisms

**Focus:**
- Beam propagation, laser-matter interaction, electron thermalization
- C++, Mathematica

Contact: Christoph Schöler – 0241/8906-8307 – christoph.schoeler@ilt.fraunhofer.de
Simulation of Laser Cutting

- Laser cutting of metals
- Identification and analysis of dominant properties influencing the roughness of the cut edges

Tasks:
- Modeling of melt flow dynamics
- Investigation of melt film stability

Focus:
- Laser matter interaction, fluid dynamics
- C++, Mathematica etc.

Contact: Torsten Hermanns – 0241/8906-8763 – torsten.hermanns@ilt.fraunhofer.de
Modeling Laser Cutting Using Port-Hamiltonian Systems

p-H Systems: “a unified framework for the modeling of systems belonging to different physical domains”

Tasks:

- Modeling the cut front using p-H Systems Theory
- Model Reduction & Investigation of melt film stability

Focus:

- Mathematics (PDEs, ODEs, DAEs, and Numeric)
- Programming

[2014, Port-Hamiltonian Systems Theory: An Introductory Overview, A. van der Schaft and D. Jeltsema]

Contact: Christian Bauer – 0241/8906-610 – christian.bauer@nld.rwth-aachen.de
Simulation of Laser Micro Welding

- Deep penetration welding with micrometer-sized laser spots
- Identification of mechanisms leading to process instabilities
- Development of new process control strategies

Tasks:
- Hierarchical process simulation
- Analysis of process stability

Focus:
- Hydrodynamics, phase boundaries
- Programming (C++), Numerics (FEM)

Contact: Christoph Schöler – 0241/8906-8307 – christoph.schoeler@ilt.fraunhofer.de
Further Possible Topics

- Simulation of laser cutting
- Simulation of laser drilling
- Simulation of laser additive manufacturing
- Meta modelling
- Development of Customer Simulation Tools

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