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Jeremias Schmidli

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**Numerical Analysis of the Adaptive Solar Facade**

**A Description**

The Adaptive Solar Façade (ASF) is an array of independently actuated thin film solar panels. The actuation allows for solar tracking and precise control of solar insolation into the building. This in turn can optimize solar harvesting, and reduce the building heating, lighting and cooling demands.

The ASF constructed at the HoNR Building consists of 50 panels, where each panel can be independently actuated to ±40°. Although the technology of the ASF has been demonstrated, the optimum angles to which the panels should be set for various different possible states have to be further evaluated.

**B Goals and Objectives**

The Goal of this thesis is to numerically evaluate the Adaptive Solar Façade. In order to achieve this goal, various aspects have to be evaluated, such as building energy usage optimization, electricity production of the solar panels and building modelling.

**B.1 Literature review on building shell technology with an emphasis on numerical simulation.**

**B.2 Reproduce previous numerical simulation of the ASF.**

**B.3 More complex general numerical simulation, including larger range of angles as well as different layouts. Most promising direction will be evaluated in more detail with a supercomputer from ETH (Euler / Brutus).**

**B.4 Evaluate possibilites of integrating photovoltaic energy production into the optimisation.**

**B.5 Comparison of ASF to simpler solar façade types (e.g. one axis tracking or static façade).**

**B.6 Evaluate influence of building type, when and where does it make sense to install an ASF?**

**B.7 Formulate future design considerations based on results.**

**C Planned work procedures**

**Internal meetings staff:** meetings between student and staff will be scheduled according to the project needs.

**Internal meetings supervisors:** regular meetings between the student and supervisors will take place according to the project needs.

**Mid-term presentation:** At the middle of the project (3 months), the student will present the work at the Institute of Technology in Architecture.

**Final presentation:** At the end of the project, the student will present the work at the Institute of Technology in Architecture.

Duration: December 1st, 2015 until June 1st, 2016.