

Natália de Queiroz Nome

(QUEIROZ, Natália)

nataliaqueiroz@labcon.ufsc.br

UFSC – Federal University of Santa Catarina

Supervisor: Fernando Oscar Ruttkay Pereira, Ph.D.

Title: Performance-based Facade Design: the control of insolation and daylight

The dissertation presupposes the potential of “performance-driven-design” as a support for insolation control solutions in non-residential building facades. The term “solar control device (SCD)” in this research describes transparent openings and shading systems associated to the facade. The focus is on the architectural design decision-making process. It discusses shape generation systems, algorithmic modeling, integrated evaluation methods, and multi objective optimization cycles.

The latest research on analytical models in performance optimized SCD design have an exploratory characteristic. They often use non-interoperable systems, time-consuming simulation methods, study purely geometry or do not address models sensitive to materiality and influence of transparent elements as a solar control strategy. Choice of performance indicators in the design context are usually not explored. Phenomena associated with façade design, such as glare, are also often overlooked.

The parametric modeling system produced allows pagination of the windows; inclusion of shading and light shelves and establishes data strategies for geometrically complex solutions based on performance. The unified analytical model is based on Radiance and is up to ten times faster than Daysim based models. The performance indicators explored allow the SCD solutions classification based on requirements of daylighting, glare and thermal performance (quantitative analysis). In addition, there are qualifiers for the solution, area and obstruction indicators (qualitative analysis). These can be used to help the choice of the final solution.



Natalia Queiroz is an architect and Urbanist (2009), with master’s degree in industrial design (UFPE-2015). She is a Ph.D. student at the Federal University of Santa Catarina – Brazil and a researcher in Comfort Laboratory at same institution. She has experience in environmental computational simulation, building regulation, energy efficiency, bioclimatic architecture, and parametric and algorithmic modeling. She is a member of the workgroup proposing a new daylighting method for the NBR 15575, the Brazilian standard regulation for residential building performance. Her current research investigates Performance-based design methods to establish optimal complex solar control facade solutions.