THIN SHELL STRUCTURE DESIGN TOOL

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An Abstract of a Thesis Submitted to the Graduate

Faculty of Rensselaer Polytechnic Institute

in Partial Fulfillment of the

Requirements for the Degree of

MASTER OF SCIENCE

Major Subject: COMPUTER SCIENCE

The original of the complete thesis is on file
in the Rensselaer Polytechnic Institute Library

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May 2010
(For Graduation May 2010)

Thin-shell structures have been used for many years in the construction and design of buildings. They allow the usage of less material to enclose larger spaces, are structurally efficient, and have a natural aesthetic beauty. However, they can be difficult to design, as the exact shape required for structural stability depends on the material used, the size of the shell, potential exterior or interior loading, and other constraints. Fortunately, it is possible to simulate these structures quickly and accurately, allowing architects to concentrate more on their design and less on ensuring that their building is stable. The tool described in this thesis simulates thin-shell structures and aids architects in designing and optimizing them. The tool uses a unique three-window interface to allow the user great flexibility in designing structures. The back end is designed to be quick and efficient, allowing the user to design quickly, watching the structure change in real time.

A major part of this project was the conducting of a user study. This user study was essential to the project because it gave feedback from the users for whom the tool was designed. This feedback is essential because while a tool can be designed and refined indefinitely, these revisions are meaningless if they are not useful to the users. Obtaining feedback from users verified that the tool is useful to real users and provided many suggestions for improvements and additions. Some of these features had already been planned for future implementation, but others were completely new suggestions.