

Is there a case for gridshell structures in humanitarian assistance and disaster relief efforts?

Summary Paper

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1 TARGET AUDIENCE

Humanitarian assistance and disaster relief (HA/DR) organizations (both governmental and non-governmental), Organizations specializing in structural solutions for disaster relief, Organizations requiring temporary large-span shelter in remote areas, Engineers specializing in temporary structures.

2 BACKGROUND

HA/DR efforts often require that temporary structures be erected to benefit affected populations. While considerable efforts address family dwellings and small shelters, large-span structures for community gatherings and group coordination are often overlooked. This paper analyses the efficacy of gridshell structures in such an application. Ultimately, this paper suggests that gridshell structures are well suited for HA/DR applications.

3 PURPOSE

The purpose of this paper is to determine if gridshell structures are an effective means for temporary large-span shelter in humanitarian relief and disaster response applications.

5 METHOD

This paper uses a parametric study of generic gridshell structures that are tailored to the specifications of an HA/DR application. The parametric study uses finite element analysis techniques to compare the structural performance of each structure. The results of the study are compared with existing solutions to determine whether a gridshell structure could be effective in similar circumstances.

6 RESULTS

Ultimately, the results of the parametric study suggest that gridshell structures are an effective means for providing large-span shelter in HA/DR efforts. Efficient bracing layouts gleaned from the parametric studies allow for the structure to adapt to various loading conditions. With further research and development, the structures could become a viable tool in HA/DR.

7 IMPLICATIONS FOR TARGET AUDIENCES

This research serves as a preliminary study that demonstrates the effectiveness of using gridshell structures in HA/DR settings and further serves to expose this community to these novel structures. Using the data produced during these studies, future work to fine-tune the technology is made easier. Work on this project is ongoing at the U.S. Naval Academy and focuses on building a substantial full-scale prototype of the structure. Organizations interested in this technology can use this study as a baseline for further analysis to produce a temporary gridshell structure well suited for applications in HA/DR.