

# STUDY ON 3D TRUSS FLEXIBLE SHAPE BRIDGE USING ORIGAMI ENGINEERING

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## Summary

The purpose of this paper is to propose a design method when designing a bridge from origami engineering. Origami engineering has the characteristics of "foldable", "high rigidity" and "engineering design".

Origami engineering is widely used from interior design to the space field. There are various types, but in this paper, we focus on Yoshimura folds. Focusing on the characteristics of Yoshimura folds, we use it as the main girder of the bridge in this study. Analyze the properties of Yoshimura folds and devise a bridge model. Bridge modeling is determined by the section angle  $\theta$ , the relationship between span and rise, and the relationship between girder height and span. Make a model and check the folding behavior. Determine the parameters for making a wooden bridge with a span of 8 m. Finite element method analysis and eigenvalue analysis are performed from the determined parameters. Stress analysis and resonance are examined based on the analysis results. Finally designed and produce a wooden footbridge.

In this study, we designed and constructed one design proposal using origami engineering. By limiting the material to wood, it became a bridge like this one. However, it can be said that various shapes can be expected depending on the material. In the future, we can expect various designs for deployable bridges using origami engineering.

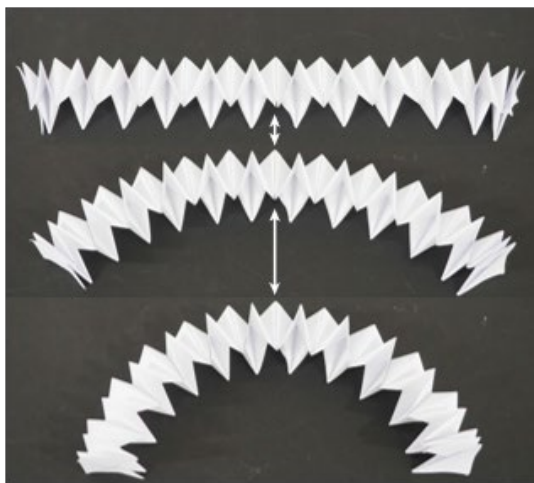


Fig. 1. Origami model



Fig. 2. 8-meter span prototype

**Keywords:** Origami engineering, Yoshimura folds, 3D cross section, tubular type