

The New Large Space Frame - TAMA-SUDARE

Junichi Sasaki, Tatsuya Yamada

Takenaka Corp. Osaka Head Office, Design Department.

Contact: sasaki.junichi@takenaka.co.jp

Abstract

The authors propose a Tama-Sudare Frame as a new type of structural system that can attain a flexible configuration. This frame consists only of thin bars (main members), tension rods and pin joints, just like the sticks, threads and knots of Tama-Sudare, a tool used for traditional Japanese performance.

Tama-Sudare Frames complement one another and can form a huge space like the roof structure of stadium. Moreover, single frames made of repetitions of several types of small members facilitate construction and transportation. Tama-Sudare Frames can create structures of various scales not only stadiums by changing the member size.

Keywords: TAMA-SUDARE; Lightweight Structures; Deployable and Retractable Structures; Temporary Structures;

1 Introduction

As a proposition of a new large space frame, the authors show a new type of structural system inspired by "Tama-sudare", the traditional performance in Japan (Figure 1). This structural system was applied to propose a new stadium never seen before (Figure 2).

2 Concept

The authors propose the new system which is composed of small members combined ingeniously like traditional wooden buildings in Japan (Figure 3). This system consists only of "sticks" (thin bars), "threads" (tension rods) and "knots" (pin joints) just like "Tama-Sudare" (Figure 4). Each member, even though which is not so tough, support mutually to keep stability in the system, and then they can form the large structure (Figure 5).

Because of flexibility made by the smallness of each member, the system can create various shapes and density.

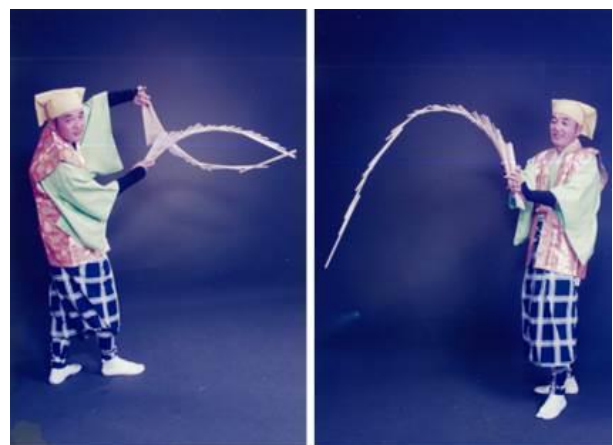


Figure 1. Nankin-Tama-Sudare

Moreover, thanks to the simplicity of the structure composed by a few kinds of repeated members, it is easy to transport these members and construct