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SUSSPENSION STRING FUTURE STRUCTURE

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SUMMARY

In the first part of the article discusses about kinematic displacements problem in cable structures. More attention is paid to one-span suspension structures. The main advantages and disadvantages of such constructions are indicated. The behavior of one-span suspension structures is discussed. Introducing a new form of design for the future – string that is combined with a one-span suspension structure design and presents the advantages of this design against one-span designs. Numerical analysis of the construction is also presented. Symmetric and asymmetric loads are analyzed separately. The main parameters and behavioral characteristics of such a construction are presented.

Keywords: *Symposium, Bridge Engineering, Structural Engineering, Pre-Stressed Constructions, String, Cable, Kinematic Displacements*

1. INTRODUCTION

Susspension bridges are among the oldest bridges in history. One of the most rational constructions is a single-span design [5, 7, 14], however, this design is more commonly used for pedestrian bridges and its outline is not suitable for other transport. When needed to reach one side of a river, gorge or other obstacle, single-span bridges were made of organic ropes. Nowadays, stress-ribbon structures use much more innovative solutions, i.e. Strong steel, stranded cables, carbon fiber and other innovative materials [3, 9, 11]. The disadvantage of such structures is the high deformability against asymmetric loads i.e. dicplacements in kinematic origin [1, 4, 6, 8,13]. In order to produce the most efficient construction, cable-supported structure can be combined [12, 15] with a string [10]. In addition to reducing the kinematic displacements in the structure when the load is asymmetrical, the string would also form a straight line for the transport movement. It is necessary to note that in this type of construction, the upper element of the string may be pre-stressed.

The behavior of the structure depends on many parameters that are discussed in section 2. Numerical calculation method are used to analyze the displacements and stresses of the structure. Kinematic and elastic displacements are presented separately. At the end of the article, an economical comparison of the construction efficiency with single-strand construction and string is presented.

The structure is fixed at the ends by non-sliding supports. The main parameters of the combined string system comprises the lower cable sag, the lower cable and string axial rigidity ratios and the pre-tensioning force of the string. The outline of the lower cable forms a parabola [1]. The construction consists of 3 main elements: String, lower cable and struts. These three elements combine the structure to work together (Fig. 1).

By combining these different constructs into a common system, the goal is to obtain a more rational combination string system. In addition, single-span bridges are nowadays more commonly used for pedestrian traffic because of the initial sag of the structure and are quite deformable, which is why such bridges are rarely used for traffic organization. String construction allows to form a real surface, which can be used for traffic other than pedestrian traffic or for future transport

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