Experiences from the wind-tunnel testing of the Hardanger Bridge section model

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Abstract

This paper presents an overview of the lessons learned and results from the extensive wind tunnel testing of the Hardanger bridge using a new experimental setup. Special attention is given to the reliability of wind tunnel results, the validity of the superposition principle, the presence of higher-order effects, and the importance of horizontal motion.

Keywords: self-excited forces; wind tunnel testing; section model, bridge aerodynamics.

1 Introduction

The Hardanger Bridge showed in Figure 1 and located in Hordaland county, is currently the longest suspension bridge in Norway. With a 1310 m long main span suspended between 186-meter tall towers, the bridge is a landmark in the Hardanger fjord. However, its location and complexity of the surrounding terrain, makes it exposed to harsh local environment and storms striking the western coast of Norway [1]. The Hardanger Bridge stands out also as one of the slenderest bridges in its class. In fact, neither of the current top 10 longest suspension bridges has a larger slenderness ratio (ratio between span length - L and width of the bridge deck – B) than the Hardanger Bride – see Table 1 for comparison with selected long-span bridges.

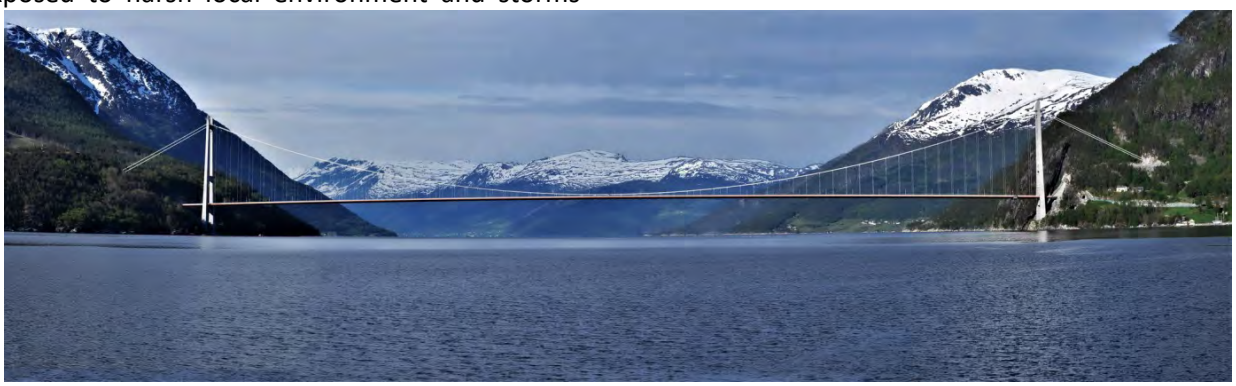

Figure 1. Hardanger Bridge spanning Hardanger fjord. Photo by Aksel Fenerci.

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