

Eccentric-wing flutter stabilizer – Simplified analysis and main findings

Uwe Starossek

Prof. Dr.-Ing.

Hamburg University of Technology

Hamburg, Germany

starossek@tuhh.de

The author received his civil engineering degree from RWTH Aachen in 1982 and his doctoral degree from Stuttgart University in 1991. He is a consultant and professor of structural engineering.



1 Abstract

A device aiming at preventing bridge flutter is studied. It consists of fixed wings positioned with a large lateral offset along the edges of the bridge deck. The wings are attached to the bridge deck by means of lateral support structures. Flutter analyses for various kinds of bridges and wind-tunnel tests confirm the flutter-suppression effectiveness of the wings. They constitute a passive damping device without moving parts. This is an advantage over devices with moving parts, which meet resistance due to reliability and maintenance concerns. The main findings to date concerning analysis, flutter-suppression effectiveness, and cost-efficiency of the eccentric-wing flutter stabilizer are summarized. In addition, a simplified approach for the analysis of torsional flutter of a bridge equipped with this device is presented and applied to the first Tacoma Narrows Bridge. It is found that with relatively small effort the flutter stability of that bridge could have been substantially improved.

Keywords: bridge; wind-induced vibration; flutter; torsion; passive control; fixed wing; design; cost.