

Progressive collapse susceptibility of a long span suspension bridge - DTU Orbit (09/11/2017)

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Long span bridges are complex structural systems, often having strategic roles in the network infrastructures; consequently their susceptibility to a disproportionate response in case of local failures needs to be assessed. In particular, current regulations prescribe that the structural robustness should be maintained in case of an accidental hanger detachment. Local damages in bridges, which are characterized by an horizontal load transfer system, may progress along the deck or along the suspension system, as the dynamic overloading of the structural elements immediately adjacent to the failed ones may lead to subsequent failures. In suspension bridges, which are characterized by a relatively low continuity of the system, the damage of the deck may favor a collapse standstill, in case of an early detachment of the deck collapsing section. In the paper, a long span suspension bridge is taken as case study and the robustness of the system is investigated with respect to the entity and the location of an initial damage of the hangers. The analyses are carried out with the avail of a finite element model (FEM) of the bridge, which accounts for mechanical and geometrical nonlinearities as well as for the dynamic effects of the abrupt failures. Critical aspects of the design are highlighted and possible countermeasures for enhancing the structural response are suggested.

General information

State: Published

Organisations: Department of Civil Engineering, Section for Building Design, Sapienza University of Rome

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Pages: 272-283

Publication date: 2013

Host publication information

Title of host publication: Structures Congress 2013

Publisher: American Society of Civil Engineers

ISBN (Print): 978-0-7844-1284-8

Main Research Area: Technical/natural sciences

Conference: Structures Congress 2013, Pittsburgh, United States, 02/05/2013 - 02/05/2013

DOIs:

10.1061/9780784412848.025

Source: dtu

Source-ID: n::oai:DTIC-ART:inspec/391927502::31921

Publication: Research - peer-review › Article in proceedings – Annual report year: 2013