ملخص البحث رقم (5)

العنوان باللغة الإنجليزية:

Progressive collapse analysis of prestressed concrete girder bridges using improved applied element method

الملخص باللغة الإنجليزية:

In this paper, the Improved Applied Element Method (IAEM), which was originally developed as an effective analysis technique for large-scale bonded and unbonded prestressed structures, is utilized to carry out failure modeling of prestressed bridges under different hazard loads. A typical prestressed concrete girder bridge is analyzed under two hazardous loading scenarios. The first one is applying a detonation charge located in the middle of the central span, while the second scenario is a sudden failure of a column representing a truck or a vessel colliding with the bridge pier. For both scenarios, the collapse analyses of the bridge structure after damage are explored. In addition, the mechanism and severity of damage in the bridge pier and deck are investigated. Both material and geometric nonlinearities are considered in the analy- sis. Moreover, it considers contact-impact, re-contact, and inertia effects, and hence, it can track the collapse stages of the structure as well as debris movement until the complete collapse of the structure. The results show a strong capability for simulating the total performance of the bridges from early the stages of loading until the total col- lapse, with a clear graphic representation of the collapse phenomena.

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