The bridge over the Adda River in Brivio: history, full-scale testing and FE modelling

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ABSTRACT

Historical bridges are an important part of the Italian national architectural heritage and often represent essential nodes of the contemporary road and railway network. A great number of historical reinforced concrete (R.C.) arch bridges were erected in Italy in the first half of the 20th century, as the concrete arch was the most common solution adopted for bridges spanning over 40.0 m or more. Of course, many of these bridges, which were designed according to what today are considered outdated code regulations, are still in service, and their structural assessment is of increasing concern. These structures require a special attention because are exposed to several potential damage causes, such as aging of the materials, effects of pollution, lack of maintenance, inappropriate use, increase of traffic vibrations and natural hazards [1]. The procedure to assess their structural safety involves several tasks, according to the multidisciplinary approach presented in the modern guidelines of restoration and conservation of historical buildings [2]. For this purpose, the paper summarizes the main results of the performed structural assessment of a historical three equal R.C. tied arch spans bridge. The bridge was built between 1913 and 1917 over the Adda river in Brivio [3], a town in northern Italy about 50 km far from Milan. It has a total length of about 133.0 m and three arch spans of 44.0 m approximately and represents an important node for the vehicular traffic of the region. After a minor intervention of maintenance performed on one pier, the local Authorities committed to Politecnico di Milano an extensive investigation of the bridge, including: (i) documentary research and review of the bridge history; (ii) visual inspection and geometric survey of each span; (iii) full-scale load tests and ambient vibration tests; (iv) FE modelling of each span and validation of the numerical models (by using the available experimental results) and (v) structural assessment of the bridge in its present condition. The present paper first reports the carried out historical investigation, and then summarizes the complete results of the experimental tests performed on one span (visual inspection, geometrical survey, full-scale load tests and dynamic tests) as well as the development of a FE updating numerical model used within a first vulnerability assessment of the structure.

REFERENCES

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