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# *ABSTRACT*

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Masonry arch bridges constitute today' oldest form of passage which keeps economical and social significance. Over 30% of bridges belonging to Spanish road network are of masonry, amount that reaches 40% when talking about the Spanish railway network. In the light of these data, the functional value of these structures is obvious; moreover, their condition of historical, artistic and technical heritage gives them an extra value. Nevertheless, there is no doubt that the amount and weight of the traffic held up by these bridges has increased since they were designed and built. The high amount of these structures which, despite of this, are still functional, shows how durable are their building materials, how appropriate is their structural work and how suitable was their design.

So, after some centuries of service, the majority of these bridges show some deterioration and new necessities of load, due to the present service demands. For this reason, the old rules of good practise can not be generally applied and are incomplete now and out of their valid field. It has been necessary, therefore, to arrange improved analysis, analytics such as experimental methods, which let us know and predict the behaviour of this structural typology with enough accuracy and exactness.

This is why research about structural behaviour of masonry arch bridges is nowadays fiercely active. In the UPC's Technological Laboratory of Structures of the Construction Engineering Department, researches are carrying out several experiments about different kinds of real-scale masonry arch bridges, focused on a better understanding of how they works. Specifically, this work consists on design, realization and interpretation of the third experiment of leaded to collapse masonry arch bridge; concretely a 3'2 span metres masonry full semi-circle bridge.

Before this, the structural working of masonry bridges is analysed, describing the different structural elements and studying their work inside the resistant mechanism of the bridge. Likewise, the experimental antecedents about this structural typology are identified and analysed, paying more attention to the tests that, like the studied, have been carried out on a real-scale model built in a laboratory. All this must let us establish the fail mode of the typology studied and predict and control the fail form expected for the type of bridge tested, according with the particular load conditions.

Next, the design and construction of the bridge is going to be described, as well as its instruments used for scoring and test until breaking. The results obtained are interpreted and checked with analytical and experimental predictions about the bridge's answer, the fail mode and the critical load. Finally, the conclusions of the experiment are set out and, basing on the won experience, some recommendations for future analytical and empirical workings with this structural typology are done.