

# **Monuments and Historic Buildings: Earthquakes and Structural Engineering**

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**Abstract** - Unreinforced masonry (URM) buildings are a relevant part of the worldwide building stock. These include stone, brick, adobe or earthen masonry structures and represent globally about 50% of the buildings stock. The widespread of most of this built heritage has been achieved based on empirical knowledge passed by generation to generation and, therefore, URM structural behavior was often ill-understood. These constructions have been typically made to withstand vertical loads only and, having a low strength/mass ratio, are rather vulnerable to dynamic horizontal loads as earthquakes, impact or blast actions. This addresses the importance of carrying out urgent measures in the URM built stock to avoid human and societal consequences and to minimize future economic impacts. Yet, intervening in these constructions is a complex process, due to the lack of structural information and due to their high importance. A scientifically based process is less susceptible to inadequate actions, which clearly sets a convenient context for the continuous development of more powerful numerical strategies. The talk addresses first the concepts of risk in structural engineering. Then, the damage in a recent earthquake in Greece is shown, together with shaking table tests. Subsequently, tools used for safety assessment at territorial scale and building scale are presented, together with some case studies.