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FOREWORD

Foreword special issue LORCA's earthquake

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On May 11 2011 at 1705 hours, a small 4.5 Mw. magnitude earthquake struck the town of Lorca in south-eastern Spain. Other than alarmed citizens, only minor damage to buildings occurred due to this quake. Unfortunately at 1847 hours, a second shock registering a magnitude of 5.1 Mw. and very shallow (just around 2 km under the city) produced the largest seismic catastrophe registered in Spain in the last 120 years.

This second shock is commonly referred to as "Lorca's earthquake" and the following papers describe the context, circumstances and consequences of the event.

Spain is a country of moderate seismic hazard in a global context. Before the Lorca earthquake, the most destructive earthquake in modern times was the so-called "Andalusian earthquake" (25th December 1884) that resulted in 750 fatalities and more than 1,500 injuries, reaching X in Mercalli's intensity scale.

Despite the lack of catastrophic events in the last 120 years, Spain has always had a scientific interest in seismic phenomena (possibly as a continuation of the historical experience gained in colonial times through seismic events much stronger overseas). This interest includes writing seismic codes, enforcing special measures for building construction and developing state of the art computational methods.

It is worth mentioning along this line, the experience gained in the construction industry during the 1970s and 1980s relative to the strict conditions for the design of nuclear power plants, as well as the research performed during the following years collaborating in the preparation and support of EUROCODE 8. In 1992, Madrid hosted the World Conference in Earthquake Engineering with the subsequent updating of knowledge of national administration, contractors and academia.

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Nevertheless, it seems that there is a permanent debate among contractors, designers and academics. More often than not, Code updates are systematically dismissed under the syllogism "why increase costs if nothing special has happened in our country?". This syllogism reflects the lack in the Spanish society of a real concern on the threat of earthquakes, at least a concern strong enough to translate the risk perception into protective behavior. Consequently, putting aside special constructions, the design and construction methods tend to be the same, whether buildings are in seismically hazardous areas or not. There is a need of earthquake awareness campaigns from public policy makers, and also an effort from academia to strengthen the training on seismic design of the professionals involved in the construction industry.

We think that there has been also a decrease in "building art" or know-how of labor involved in new building construction, induced perhaps by the increasing demand for new homes, growing cities and the ambition for larger benefits in shorter times. All these bad byproducts of the so-called housing bubble leading to ignoring of professional ethics.

Within this framework, Lorca's earthquake resulted in 9 fatalities, more than 300 injuries, the evacuation of 10,000 people out of 60,000 in Lorca's downtown and led to a desolated landscape in spite that only one modern building collapsed during the earthquake.

What went wrong?

In our opinion, part of the problem is that nonstructural elements are not designed as thoroughly as the main resisting structure. In fact, all the damage we have seen in Lorca is related to wall façades, constructed in such a way that prevented the action of the main structure or changed completely its intended function and to parapets that were not correctly attached to the main structure and acted as heavy missiles against people getting out of their homes. This last effect was the cause of most injuries and all the fatalities.

The following contributions are intended to provide a comprehensive approach to the event.

Papers start with the geologic and seismologic aspects. **Martínez Díaz et al.** describe how the new data expands the knowledge of tectonic of southeastern Spain. **Santoyo et al.** studies the fault behavior including also data on soil rotations. **J. Morales et al.** carefully study the seismic series detected that, among other things, provided us with the largest acceleration (36% g on rock) recorded so far in Spain.

Alguacil et al. analyze the strong-motion to assess shaking severity. **Cabañas et al.** perform an in-depth study of the accelerograms and response spectra and **Navarro et al.** offer a local-site microzonation that is interesting due to the special topographic and geotechnical particularities of Lorca's soil. These are also present in the observed behavior of slopes whose instabilities are carefully presented by **Rodriguez-Peces et al.**

The structural response of buildings and the key role played by infill walls, is studied by **Hermanns et al.** and **Di Luca et al.** who point out the importance that those non-structural parts have in the dynamic seismic response of a building. **Basset et al.,** on the other hand, analyze the performance of masonry residential buildings.

Finally three papers are dedicated to risk evaluation and damage. **Benavent et al.** study the expected damage using an energy based index while **Rivas et al.** concentrate their efforts in the modeling of the damage scenarios. **Navarro et al.** offer an interesting analysis of the changes observed in the dynamic behavior of Lorca reinforced concrete buildings.

We hope that these studies including the seismic action, the structural dynamic response and the risk definition will be useful to clarify and understand what occurred during this catastrophic event and will help avoid similar errors in the future.

Lastly, the Guest Editors would like to thank the contributing authors for their effort.

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Prof. E. Alarcón, Prof. Mª. Belen Benito.