International Doctorate in Civil and Environmental Engineering

DOCTORAL COURSE – A.Y. 2020/21

Structural modeling of historical masonry buildings

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Calendar	
27/04/2021- 14,00-15,30	Lecture 1: Basic structural behavior of old masonry structures and the model of Heyman. The rigid and the elastic No-Tension models
29/04/2021- 14,00-15,30	Lecture 2: The boundary value problem for Heyman's masonry-like material: energy formulation and Limit Analysis
04/05/2021- 14,00-15,30	Lecture 3: Kinematic approach. Rigid block models for masonry: the PRD and CDF methods. Elementary 2d applications: arches, portals
06/05/2021- 14,00-15,30	Lecture 4: Static approach. Plane and space arches, domes, vaults. Basic applications
11/05/2021- 14,00-15,30	Lecture 5: Applications of the kinematical and statical approaches to some challenging real cases: Spiral stairs, timbrel vaults, horizontal load capacity
13/05/2021- 14,00-15,30	Lecture 6: Stability, displacement capacity and the special Dynamics of masonry: scale models
Total: 6 Lectures of 1.5 hours each	Hours: 9 credits: 4,5

Program

The undeniable fact that the teaching of construction techniques and mechanical behaviour of old masonry structures is rather marginal in the Architecture and Civil Engineering curricula, is at the base of the weakness of modern structural experts in ancient masonry assessment. Despite the fact that Architects and Civil Engineers receive a more or less deep formation in modern structural engineering theory and on its applications to steel and reinforced concrete structures, transferring such competences into old masonry assessment is not at all immediate, and requires a higher degree of study, knowledge and awareness. In the present course I address some of the crucial issues concerning the modelling of old masonry structures and, in the footsteps of Jacques Heyman, introduce and explain in some detail some possible ways in which the lesson of the old masons could be translated into simple models for masonry.