UNIVERSITÀ DI PISA

SCUOLA DI DOTTORATO INGEGNERIA "Leonardo da Vinci"
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Sede amministrativa presso il Dipartimento di Ingegneria Civile e Industriale

A V V I S O D I S E M I N A R I

Nell'ambito delle iniziative promosse dalla *Scuola di Dottorato in Ingegneria "Leonardo da Vinci"*, d'intesa con il *Dottorato Internazionale in "Civil and Environmental Engineering"* e l'*IMT – School for Advanced Studies Lucca*

venerdì 26 febbraio 2016 alle ore 11:00 saranno tenuti i seguenti seminari:

Danila AITA

Ricercatore di Scienza delle Costruzioni presso l'**Università di Pisa**

Limit and Nonlinear Elastic Analyses of Masonry Structures: an overview

Abstract. This seminar is a critical presentation of our researches over the last ten years on the mechanical response of masonry arches and vaults. We focus on a study of masonry arches conducted in parallel via both nonlinear elastic and limit analyses. The one-dimensional elastic model for masonry arches incorporates a simple but effective nonlinear constitutive law. In turn, collapse analysis is performed by the so-called 'method of stability areas', originally proposed by Durand-Claye in 1867. Rather than offering two alternative paths, the approaches may be considered complementary points of view on the same problem. In order to illustrate the main issues we focus on some examples: possible failure mechanisms for masonry arches; search for explicit solutions to the equilibrium problem of a depressed arch; arches of different shapes subject to their own weight and the weight of a superimposed wall; arch-wall-piers systems.

Riccardo BARSOTTI

Ricercatore di Scienza delle Costruzioni presso l'**Università di Pisa**

Structures that disapprove linearity: membranes, masonry structures, beams in contact with rough surfaces

Abstract. The seminar addresses some major research topics of the nonlinear mechanics group. Masonry structures and thin membranes could not be more different. However they share a common feature. Both of them show a strongly nonlinear response, so that the corresponding equilibrium problem cannot be solved by means of the standard elastic theory. Nonetheless, it seems that a solution (although approximated) to these problems may be found by using suitable nonlinear elastic models. Some solution examples of masonry elements obtained by way of a one-dimensional model is presented. Membranes are studied by using the asymptotic model known as "wrinkle theory". By this way, it is possible to find equilibrium solutions characterised by tensile stresses only (tension field). Friction is one among the major sources of nonlinearity in many different applications (even in masonry and membranes problems). The nonlinear dynamic response due to friction that may be observed in beams in contact with rough surfaces is the last topic. Some first considerations drawn from simple models are discussed.

Paolo S. VALVO

Ricercatore di Scienza delle Costruzioni presso l'**Università di Pisa**

Analytical solutions for modelling delamination of composite laminates: from elastic interface models to discontinuous cohesive laws

Abstract. Delamination is a major failure mode for composite laminates. A huge number of analytical, numerical, and experimental studies have been devoted to this topic during the last decades. The seminar presents an overview of developments carried out at the University of Pisa in the last 15 years. Analytical solutions have been determined for a number of application problems, including: buckling-driven delamination under static and fatigue loads, debonding of adhesive joints and FRP reinforcements, modelling of delamination toughness tests (DCB, ENF, MMB, DCB-UBM, etc.). In the earliest (and simplest) models, an elastic-brittle interface is considered between the separating layers; later on, piece-wise linear cohesive laws have been considered, e.g. for modelling FRP debonding; recently, discontinuous cohesive laws, i.e. with different types of behaviour in the undamaged/elastic and damaged/fracturing stages, have been proposed. In this last case, the J integral has proven to be an effective tool to easily determine analytical solutions without solving complicated differential problems.

I seminari saranno tenuti presso la Classroom 1 dell'IMT di Lucca.

Referente dell'invito: Paolo S. Valvo.

Pisa, 23 febbraio 2016.

Il Direttore della Scuola
(Prof. Ing. Stefano Bennati)