Teme de disertaţie – MASTER ADS, RC, DD
-2022-2023-

⬩ Prof. Dr. Ing. Daniel-Viorel UNGUREANU (ADS)

1. Economic and environmental assessment of a multi-storey building design in various solutions

The dissertation will investigate the environmental impact assessment and life cycle cost of a multi-storey building in Romania. The main goal is to compare the impacts of structural solution, i.e. (1) steel, (2) concrete and (2) composite steel and concrete solutions. Also, aspects of circular economy are envisaged.

⬩ Prof. Dr. Ing. Raul ZAHARIA(ADS+DD)

1.Experimental determination of thermal properties of wood in real fire conditions (master ADS) -ERASMUS+ Universitatea din Liege, Belgia

To perform numerical simulations of timber members in the firesituation, Eurocode 5 proposes some effective thermal properties of wood that allow computing the temperature distribution inside the sections. Yet, these properties have been proposed on the base of tests made under the conditions of the standard ISO 834 time-temperature curve.

The aim of this project is to verify whether these effective thermal properties are also valid for other thermal conditions, either more severe or less severe than the standard fire curve, and also particularly during the cooling phase of a real fire.

The work of the student will be to perform a series of experimental tests with an apparatus recently developed in the "Laboratoire d'essai au feu" of the Liege University. In these tests, a timber member (around 200 x 200 x 80 mm²) will be subjected on one side to a given heat flux of different intensities, including decreasing phases. Thermo-couples will be inserted in the timber sample at different distances from the exposed side. Recalculation of the temperature evolution in the samples by an existing numerical software will then be performed, first with the thermal properties presently

proposed in Eurocode 5 and, if the correspondence is not satisfactory, adapting the thermal properties to make a new proposal that allows reproducing in the simulations the results observed in the tests.

2. Possibility to model CLT panels by timber re-bars in a shell finite element (Master ADS) - ERASMUS+ Universitatea din Liege, Belgia

The utilisation of wood for structural members in building constructions is increasing, pushed by environmental considerations as well as by its inherent interesting material properties such as a high performance/mass ratio. Cross Laminated Timber (CLT) panels is a product that has seen a spectacular development in the last decade. It is used, for walls as well as for floors, in low-rise, but also more and more in medium-rise and even high-rise buildings. A good performance of timber structural members must be demonstrated, particularly in fire conditions

No solution has yet been presented to perform numerical simulations of structures made of CLT under fire conditions.

Eurocode 5 proposes some rules that allow calculating the charring rate and the depth of the zerostrength layer in CLT panels, considering possible delamination of the successive layers as well as the position of the panel, vertical or horizontal.

The first task of the student will be to determine a strategy, probably based on new effective thermal properties, that allows reproducing these results in the uniaxial numerical simulations that must be performed to simulate the behaviour of such panels in the fire situation (the software SAFIR developed at Liege University and Johns Hopkins University.

Concerning the structural behaviour, CLT panels are characterized by a juxtaposition of several layers of timber, with the grain of the material turned by 90 degrees from layer to layer. Each layer is made of a highly

anisotropic material. The idea of the second part of the work is to examine the feasibility of representing the mechanical behaviour of each panel by a combination of:
a) First an isotropic material having the properties of timber perpendicular to the grain, used on the whole thickness of the panel and ;
b) Second, a superposition of fictitious rebars oriented in the appropriate direction, having the appropriate thickness, and having uniaxial properties which give the properties along the grain when they are combined to the properties mentioned under a).

✚ Prof. Dr. Ing. Florea DINU (ADS)

1. Rezilienta structurilor in cadre pentru cladiri multietajate supuse la scenarii multi-hazard

Tema are ca obiectiv evaluarea capacitatii de rezistenta si optimizarea sistemelor structurale in cadre din otel folosite la realizarea cladirilor multietajate in cazul producerii unor scenarii de incarcare accidentala simultane sau consecutive (seism + foc, explozie + foc).
Pentru studiu se considera sisteme structurale omogene si duale, cu regim mediu de inaltime. Se evalueaza cerintele de rezistenta/ductilitate locala si globala, se analizeaza solutiile optime de dispunere a sistemelor de preluare a incarcarilor orizontale si verticale si se prezinta comparativ performantele structurilor.

✚ Prof. Dr. Ing. Aurel STRATAN (ADS)

1. Seismic performance of re-centring eccentrically braced frames with stainless steel links

2. Seismic performance of moment-resisting frames with friction damper joints

✚ Conf. Dr. Ing. Adrian DOGARIU (ADS)

1. Modelling and Analysis of Thin Shell Structures(ADS)

The purpose of this thesis is to overview the latest knowledge concerning the numerical analysis of thin shell and plated structures with some study cases. The thesis will cover mainly numerical investigations, but also will include analytical approaches, for metallic structures.
Due to the infinite number of structural forms each shell design is a unique problem that is very difficult to be solved using a usual routine design based on simple code formulas. So numerical tools are needed. Within the thesis complex numerical software (ABAQUS) will be used. The acquired knowledges within the framework of first year FEM course (and second year MSS course) are sufficient to solve and build the numerical models.
The focus will be on stability problems, on the buckling limit state assessment using global numerical analysis. The studied shell structures can be industrial storage facilities, building and stadium/arena roofs or canopies, vaults, circular flood barriers and retaining walls, curved bridge decks, well and access tunnels or some structural details etc., and will be selected together with the candidate.

✚ Conf. Dr. Ing. Edward PETZEK (ADS)

1. **Calculul unui pod de cale ferată tip cadru cu deschiderile de 2x35 m în soluţie VFT-WIB, utilizând prefabricate din beton armat cu armătură externă rigidă.**

2. **Calculul si alcătuirea constructivă pentru un pasaj rutier în alcătuire compusă cu calea jos – solutie modulară.**

3. Calculul si alcătuirea constructivă pentru un pod de cale ferată utilizând o reţea de grinzi în alcătuire compusă oţel – beton de tip VTR Rail.

🔶 S.L. Dr. Ing. Dan PINTEA (ADS)

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✚ S.L. Dr. Ing. Ioan BOTH (ADS)

1. Studiul comportarii grinzilor cu talpi cu sectiune tip teava

✚ S.L. Dr. Ing. Andrei CRISAN (ADS)

1.Influenta rigiditatii nodurilor asupra perioadei proprii de vibratie a structuerilor metalice

Studiul propus are ca scop determinarea influentei rigiditatii nodurilor asupra perioadei proprii de vibratie a structurilor metalice (MRF, EBF, CBF) si asupra eforturilor din elemente. Studiul se va conduce folosind analiza numerica (Abaqus/Ansys).

✚ S.L. Dr. Ing. Ioan MARGINEAN (ADS+RC)

1.Shell modelling of joints subjected to catenary forces

- FEM model calibration against experimental data obtained in the CMMC laboratory.
- Model optimisation using shell elements
- Parametric study

În vederea înscrierii pentru anumită temă candidaţii vor depune o cerere scrisă la Secretariatul departamentului CMMC <u>cu avizul coordonatorului de temă,</u> <u>cel mai târziu până la data de 10.01.2023.</u>

DIRECTOR DEPARTAMENT
Prof. dr. ing. Daniel GRECEA

<u>17.10.2022</u>