Tárgytematika / Course Description
Numerical methods for differential equations

GKNM_MSTA044

Tárgyfelelős neve / Teacher's name: dr. Gáspár Csaba
Félév / Semester: 2023/24/2
Beszámolási forma / Assesment: Vizsga
Tárgy heti óraszáma / Teaching hours(week): 2/2/0
Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The aim of the course is to show a theoretical as well as a practical outline of the finite element method applied to some simple elliptic partial differential equations.

TANTÁRGY TARTALMA / DESCRIPTION

Topics of the lectures: Some vector analysis. Physical problems resulting in partial differential equations. Weak forms of partial differential equations. Elliptic partial differential equations. Finite element method for 1D and 2D Poisson problems. Techniques based on Fourier, finite difference, finite element method, finite volume method, and some other methods.

Practices: Problem solving with FEniCS.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

A classroom test is necessary during the semester.

The semester ends with a written exam (evaluated by 5 marks).

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

References:

H. P. Langtangen, A. Logg: Solving PDEs in Python – The FEniCS Tutorial Volume I. Springer, 2017. ISBN 978-3-319-52462-7. https://fenicsproject.org/pub/tutorial/pdf/fenics-tutorial-vol1.pdf

Volker John: Numerical Methods for Partial Differential Equations

https://www.wias-berlin.de/people/john/LEHRE/NUM_PDE_FUB/num_pde_fub.pdf

K.W. Morton, D.F. Mayers: Numerical Solution of Partial Differential Equations. An Introduction

http://sgpwe.izt.uam.mx/files/users/uami/mlss/documentos/Morton.pdf

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AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL