

Boundary Element Methods

ECTS: 3 ECTS

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UNIVERSITY WHERE THE COORDINATOR IS: UDC

HAVE YOU GIVEN PERMISSION TO RECORD YOUR CLASSES? Yes

SUBJECT CONTENTS

1. Introduction and some preliminaries.
2. Potential problems.
3. Other applications of the boundary element method.
 - 3.1 The boundary element method in acoustics: Helmholtz equation.
 - 3.2 The boundary element method for the Stokes problem.
 - 3.3 The boundary element method for linear elastostatics.
4. Introduction to the coupling of finite elements and boundary elements.

METHODOLOGY

The contents of the course will be presented in keynote sessions, that will contribute to work skills CG3, CG5, CE4 and CS2. In addition, there will be some lab sessions in which students will be shown how to implement the boundary element method using MatLab and the software FreeFem++; this will contribute to work skills CE4 and CS2.

LANGUAGE USED IN CLASS: Spanish. It can be adapted depending on the audience.

IS IT COMPULSORY TO ATTEND CLASS? Students can attend via conference system.

BIBLIOGRAPHY

1. R. Adams, Sobolev spaces, Academic Press, 1979.
2. K.-C. Ang, Introducing the boundary element method with MATLAB, Inter. J. Math. Education in Sci. and Technology (2007) 1-15.
3. G. Beer, Programming the Boundary Element Method. An Introduction for Engineers, John Wiley & Sons, 2001.
4. G. Chen & J. Zhou, Boundary Element Methods, Academic Press, 1992.
5. W. Hackbusch, Integral Equations, Birkhauser, 1995.
6. G.C. Hsiao & W.L. Wendland, Boundary Integral Equations, Springer, 2021.
7. J.T. Katsikadelis, The Boundary Element Method for Engineers and Scientists, Academic Press, 2016.
8. W. McLean, Strongly Elliptic Systems and Boundary Integral Equations, Cambridge University Press, 2000.
9. S.A. Sauter & C. Schwab, Boundary Element Methods, Springer, 2011.

SKILLS

Basic:

CG3: To be able to integrate knowledge in order to state opinions using information that even incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge.

CG5: To have the appropriate learning skills to enable them to continue studying in a way that will be largely self-directed or autonomous, and also to be able to successfully undertake doctoral studies.

Specific:

CE4: To be able to select a set of numerical techniques, languages and tools, appropriate to solve a mathematical model.

Numerical simulation specialization:

CS2: To adapt, modify and implement software tools for numerical simulation.

WILL YOU BE USING A VIRTUAL PLATFORM? Yes. Moodle (UDC) and MsTeams.

WILL YOU BE USING ANY SPECIFIC SOFTWARE? Yes: MatLab and FreeFem++.

CRITERIA FOR THE 1ST ASSESSMENT OPPORTUNITY

Skills CG3, CG5, CE4 and CS2 will be evaluated through the solution of the exercises posed during the keynote sessions (50% of the final mark) as well as the final project carried out by the students (remainder 50%).

CRITERIA FOR THE 2ND ASSESSMENT OPPORTUNITY

Skills CG3, CG5, CE4 and CS2 will be evaluated through the solution of the exercises posed during the keynote sessions (50% of the final mark) as well as the final project carried out by the students (remainder 50%).
