Non-invasive and non-contact monitoring techniques for surface and sub-surface engineering problems. Recent advances in experimental and numerical tools

Lecturer: Dr Marcin Zieliński (University of Strathclyde, UK)

Course description:

Recent unique developments in the experimental and numerical techniques allow very detailed (non-invasive and non-contact) monitoring of both: the surface and sub-surface in various engineering applications. In this special lecture, examples of noninvasive geophysical techniques for sub-surface monitoring and detection of engineering problems will be presented. A 2-D and 3- D miniature and standard Electrical Resistivity Tomography and Conductivity Multi-Depth Mini/Explorer as a laboratory and in-situ tools will be discussed. In addition, a 2-D and 3-D resistivity forward modelling will be presented. The use of 2-D profile laser scanner for non-contact observation of material deformation (i.e. presence of cracks) will be described and compared with image analysis techniques. A complementary numerical modelling of complex three-dimensional engineering problems will be presented.

Syllabus of the lecture

1. Introduction to non-invasive and non-contact techniques
2. Non-invasive geophysical methods in engineering applications
2.1 Introduction to Electrical Resistivity methods
2.2 Introduction to Electromagnetic methods
2.3 2-D and 3-D Electrical Resistivity Tomography in laboratory and in-situ applications
2.4 2-D and 3-D Electromagnetics in in-situ applications
2.5 2-D and 3-D Electrical Resistivity forward modelling
3. Non-contact monitoring techniques for engineering problems
3.1 Overview of an existing techniques
3.2 Introduction to 2-D laser scanner
3.3 Introduction to image analysis techniques
3.4 Data analysis and processing
4. Numerical modelling of complex three-dimensional problems
4.1 Hydraulic modelling
4.2 Mesh Fragmentation Technique

Projekt „Centrum Studiów Zaawansowanych - rozwój interdyscyplinarnych studiów doktoranckich na Politechnice Gdańskiej w obszarach kluczowych w kontekście celów Strategii Europa 2020” jest współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

TERMINY WYKLADÓW			
Data	**Dzień tygodnia**	**Godzina**	**Sala**
2014-06-02	Poniedziałek	11.00-13.00	Hydro P1
2014-06-03	Wtorek	7.00-14.00	Hydro P1
2014-06-04	Środa	9.00-15.00	Hydro P1

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