Lecture III-P - course description

General information

Course name	Lecture III-P
Course ID	13.2-WF-FiAP-W-III-P- 18
Faculty	Faculty of Physics and Astronomy
Field of study	Physics and Astronom
Education profile	academic
Level of studies	PhD studies
Beginning semester	winter term 2018/2019

Course information

Semester	3
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	• prof. dr hab. Piotr Rozmej

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam

Aim of the course

Introduce students to to wave phenomena, in particular to nolinear waves.

Prerequisites

Basic knowledge of classical mechanics and fluid dynamics.

Scope

- Waves in nature
- Origin of nonlinear wave equations
- Universal wave equations
- Korteweg-de Vries equation
- Kadomtsev – Petviashvili equation
- Nonlinear Schrödinger equation
- Properties of solutions to nonlinear wave equations
- Soliton solutions
- Periodic solutions
- Analytic and numerical solutions.
- Lagrange and Hamilton formalism for several kinds of nonlinear wave equations
- Invariants and conservation laws.

Teaching methods

Lecture

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Student is able to explain the origin of nonlinear wave equations.	• SD_W01	• Exam	• Lecture
Student knows fundamental properties of solutions to nonlinear wave equations.	• SD_W01	• Exam	• Lecture
Student can recognise processes which create solitons.	• SD_W01 • SD_W03	• Exam	• Lecture

Outcome description	Outcome symbols	Methods of verification	The class form
Student is able to calculate the lowest invariants of KdV and interpret them.	• SD_W01 • SD_W03	• Exam	• Lecture

Assignment conditions

Exam – description of some theoretical problems

Recommended reading

1. E. Infeld, G. Rowlands, *Nonlinear Waves, Solitons and Chaos*, Cambridge University Press, Cambridge, 2000 (second edition).
2. G.B. Whitham, *Linear and Nonlinear Waves*, Wiley, 1974.
3. A. Karczewska, P. Rozmej, *Shallow water waves – extended Korteweg – de Vries equations*, Oficyna Wydawnicza UZ, 2018.

Further reading

Notes

Modified by dr Joanna Kalaga (last modification: 11-07-2018 13:24)

Generated automatically from SylabUZ computer system