



Module name: CFD Basics with OpenFOAM

Academic year: 2015/2016 Code: RBM-2-208-II-s ECTS credits: 3

Faculty of: Mechanical Engineering and Robotics

Field of study: Mechanical Engineering Specjalty: Informatyka w inżynierii mechanicznej

Study level: Second-cycle studies Form and type of study: Full-time studies

Lecture language: English Profile of education: Academic (A) Semester: 2

Course homepage: http://home.agh.edu.pl/iczajka/OF_inz.html

Responsible teacher: dr inż. Czajka Ireneusz (iczajka@agh.edu.pl)

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Description of learning outcomes for module

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Connections with FLO	Method of learning outcomes verification (form of completion)
Social competence			
M_K001	Student umie dokonać podziału zadań i zrealizować złożony projekt w kilkuosobowym zespole projektowym	BM2A_K06, BM2A_K07	Involvement in teamwork
Skills			
M_U001	Student umie posłużyć się programem OpenFOAM by dokonać analizy zagadnienia przepływowego	BM2A_U09, BM2A_U03, BM2A_U10, BM2A_U22	Completion of laboratory classes
M_U002	Student umie zbudować model, ocenić jego poprawność i dostroić do wyników pomiarów	BM2A_U09, BM2A_U03, BM2A_U10	Activity during classes
Knowledge			
M_W001	Student zna podstawowe sposoby modelowania zjawisk przepływowych	BM2A_W05, BM2A_W04	Activity during classes

FLO matrix in relation to forms of classes

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Form of classes										
		Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Others	E-learning
Social competence												
M_K001	Student umie dokonać podziału zadań i zrealizować złożony projekt w kilkuosobowym zespole projektowym	-	-	+	-	-	-	-	-	-	-	-
Skills												
M_U001	Student umie posłużyć się programem OpenFOAM by dokonać analizy zagadnienia przepływowego	-	-	+	-	-	-	-	-	-	-	-
M_U002	Student umie zbudować model, ocenić jego poprawność i dostroić do wyników pomiarów	-	-	+	-	-	-	-	-	-	-	-
Knowledge												
M_W001	Student zna podstawowe sposoby modelowania zjawisk przepływowych	+	-	-	-	-	-	-	-	-	-	-

Module content

Lectures

Navier-Stokes equations, boundary conditions. Different models of fluid. Turbulent and laminar flow. Turbulent models.

Finite Volume Method for solving partial differential equation. Algebraic system solvers. Discretization schemes.

OpenFOAM basics. Case database structure.

Preprocessing. Solving. Postprocessing. Serial and parallel running.

Task automation with Python and OpenFOAM.

OpenFOAM's advanced topics.

Laboratory classes

Installation of OpenFOAM, setting environment variables, running case.

Postprocessing with paraFoam basics.

Problem definition. Mesh generation, boundary conditions. Steady state simulations.

Transient simulations. Run-time postprocessing.

Discretization schemes. Different postprocessing tools. Python automation and OpenFOAM.

Method of calculating the final grade

Final grade is at most cases equal to laboratory mark but it can be modified by personal interview

Prerequisites and additional requirements

Prerequisites and additional requirements not specified

Recommended literature and teaching resources

Z. Kazimierski: Podstawy mechaniki płynów i metod komputerowej symulacji przepływów, Łódź 2004
J.H. Ferziger, M. Perić: Computational Methods for Fluid Dynamics, Springer

Scientific publications of module course instructors related to the topic of the module

Additional scientific publications not specified

Additional information

None

Student workload (ECTS credits balance)

Student activity form	Student workload
Preparation for classes	15 h
Preparation of a report, presentation, written work, etc.	25 h
Participation in lectures	15 h
Participation in laboratory classes	15 h
Examination or Final test	5 h
Summary student workload	75 h
Module ECTS credits	3 ECTS