

科目名 Course Title	Flow Transition and Control(流れの遷移と制御E) [Flow Transition and Control]		
講義題目 Subtitle			
責任教員 Instructor	田坂 裕司 [Yuji TASAKA] (大学院工学研究院)		
担当教員 Other Instructors			
開講年度 Year	2014	時間割番号 Course Number	092153
開講学期 Semester	1学期	単位数 Number of Credits	1
授業形態 Type of Class	講義	対象年次 Year of Eligible Students	～
言語コード・言語 Language Code, Language Type	1 英語で行う授業		
補足事項 Other Information			
キーワード Key Words			
Flow instability, Pattern formation, Flow transition, Turbulence, Flow control			
授業の目標 Course Objectives			
Deep understanding of flow instability, flow transition, and turbulence for engineering applications			
到達目標 Course Goals			
Students are able to			
(1) explain important issues of the flow instability, transition and turbulence,			
(2) describe mathematically the flow instability and transition,			
(3) evaluate turbulent flows,			
(4) provide ideas for flow control based on the knowledge and skills summarized above.			
授業計画 Course Schedule			
(1) Introduction for flow instability, transition and turbulence			
(2) Flow instability: Theory (stability of solution and bifurcation, linear stability analysis, Landau equation)			
(3) Flow instability: Phenomena (Rayleigh-Benard convection, Taylor-Couette flow, K-H instability, Wake, etc)			
(4) Flow transition (Landau-Hopf scenario, Ruelle-Takens scenario, finite amplitude problem)			
(5) Scaling for turbulent flows (Kolmogorov's ideas)			
(6) Turbulence and vortex motion (vorticity equation, stretching, tilting)			
(7) Statistical approach for turbulent flows (Reynolds decomposition, Reynolds equation, eddy viscosity, turbulent model)			
(8) Flow control (flow pattern, vibration, separation, drag reduction)			
準備学習 (予習・復習) 等の内容と分量 Homework			
Submitting reports are required to evaluate the understanding at each topic.			
成績評価の基準と方法 Grading System			
The reports submitted are evaluated for the grading.			
テキスト・教科書 Textbooks			
講義指定図書 Reading List			
Hydrodynamic stability, Cambridge University Press/P. Drazin and W. Reid: Cambridge University Press, 2004			
A First Course in Turbulence,/H. Tennekes and J. L. Lumley: The MIT press, 1972			
参照ホームページ Websites			
研究室のホームページ Website of Laboratory			
http://ring-me.eng.hokudai.ac.jp			
備考 Additional Information			