Lecture Notes 414.341

선 박 해 양 유 체 역 학

MARINE HYDRODYNAMICS

2019년 6월 28일

Suh, Jung-Chun
서 정 천

Seoul National Univ., Dept. NAOE
서울대학교 공과대학 조선해양공학과

0

OUTLINE OF COURSE

0.1 Course Description 1
0.2 References. 2
0.3 Course Contents 2

0.1 Course Description

The course is prepared for undergraduates who are interested in the extended application of hydrodynamics to naval architecture and ocean engineering such as resistance, viscous boundary layer, propulsion, floating motion in waves. The subject has been chosen as continuum hypothesis, flow description, conservation and governing equations, model test characteristics, hull-propeller interaction, viscous flows, separation variables and Green theorem, potential flows, and added mass.

0.2 References

(1) Newman, J. N., ”Marine Hydrodynamics,” MIT, 1977 (corrected 1997).

(2) G. K. Batchelor, ”An Introduction to Fluid Dynamics“, Cambridge Univ. Press, 1967.

(3) ”Principles of Naval Architecture”, SNAME, 1988 (revision 2010).

(4) Sears, W. R., Theoretical Aerodynamics Part 1: Introduction to Theoretical Hydrodynamics, Ithaca, New York, 1970.

(5) Parsons, M. G., Lecture Notes for Ship Resistance and Propulsion II, Univ. of Michigan, 1984.

(6) Brockett, T., Lecture Notes for Ship Resistance and Propulsion III, Univ. of Michigan, 1988.

(7) 서정천, 수치선박유체역학 2 강의록, 2010.

(8) Yue, D., Lecture Notes for Marine Hydrodynamics, MIT, 2001 (also MIT Website Course, 2004).

0.3 Course Contents

- 1 wk: Outline of Course, General Statements
- 2 wk: Fundamentals of Continuum Mechanics: Introduction, Basic Math.
- 3 wk: Model Testing: Resistance, Motion
- 4 wk: Model Testing: Propulsion, Waves
- 5 wk: Motion of Viscous Fluid: Flow description, Forces, Stress tensor, Vorticity, Navier-Stokes eq., Boundary conditions
- 6 wk: Transport theorem, Analytic solutions of Navier-Stokes eq.
- 7 wk: Boundary layer of flat plate

- 8 wk: Laminar boundary layer theory
- 9 wk: Turbulent flows of plate
- 10 wk: Motion of Ideal Fluid: Introduction
- 11 wk: Kinematics, Velocity potential
- 12 wk: Bernoulli equation, Stream function
- 13 wk: Mapping, Separation of variables, Green theorem
- 14 wk: Singularity distribution, Hydrodynamic forces
- 15 wk: Added mass, Equation of motion