cursos

extensión universitaria

2016

universidad de león

GAS DYNAMICS

05/07/2016 - 22/07/2016

Información y matrícula

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GAS DYNAMICS

DIRECTOR:

Jesús Gonzalo de Grado. *Profesor. Escuela de Ingenierías Industrial, Informática y Aeronáutica. Universidad de León.*

LUGAR:

Departamento Ingenierías Mecánica, Informática y Aeroespacial

FECHAS:

05/07/2016 - 22/07/2016

HORARIO:

Martes, Miércoles y Jueves, 9 a 13 h

DURACIÓN:

30 horas

NÚMERO DE ALUMNOS:

Mínimo: 8 y Máximo: 20

TASAS:

Ordinaria: 200 €

DESTINATARIOS:

Universidad de León y Universidad de Washington. Alumnos en aerospacial después de segundo año.

CRÉDITOS DE LIBRE CONFIGURACIÓN:

3 créditos LEC - 1,5 créditos ECTS

OBJETIVOS:

1) Understand pressure, temperature, internal storage, mean free path and transport properties from a molecular point-of-view.

Comprender la presión, temperatura, almacenamiento interno, significaría propiedades libres de ruta y de transporte desde un punto de vista molecular.

2) Be able to calculate aerodynamics of bodies in free-molecular flow.

Ser capaz de calcular la aerodinámica de los órganos de flujo libre molecular.

3) Be able to apply the law of mass action.

Ser capaz de aplicar la ley de acción de masas.

4) Be able to calculate and contrast 1-D ideal and real gas flows.

Ser capaz de calcular y flujos de gas ideal y verdadero contraste 1-D.

5) Be able to understand and estimate pressures and heating on hypersonic and transatmospheric vehicles.

Ser capaz de comprender y estimar las presiones y calefacción en los vehículos hipersónicos y transatmosféricos.

AA 400 GAS DYNAMICS

Summer 2016

CATALOG DATA:

GAS DYNAMICS, 3 credits

Introduction to kinetic theory and free molecule flow. Review of thermodynamics. One-dimensional gasdynamics, one-dimensional wave motion. Combustion waves. I deal and real gas application.

PREREQUISITES BY TOPIC:

1) Thermodynamics

2) Introductory compressible aerodynamics

TEXTBOOK:

Prepared notes (D. S. Eberhardt)

REFERENCES:

Liepmann and Roshko, "Elements of Gasdynamics," Wiley 1967

Shapiro, "Dynamics and Thermodynamics of Compressible Fluid Flow," Vol. 1, Ronald 1953

GOALS:

1) To understand concepts of kinetic theory and its application to rarefied flows.

2) To understand and be able to solve problems with real gases in one-dimensional flow, including real gas flows, combustion waves and non-steady flows and unsteady test devices.

OBJECTIVES:

1) Understand pressure, temperature, internal storage, mean free path and transport properties from a molecular point-of-view.

2) Be able to calculate aerodynamics of bodies in free-molecular flow.

3) Be able to apply the law of mass action.

4) Be able to calculate and contrast 1-D ideal and real gas flows.

5) Understand non-steady waves and be able to predict performance of test devices that operate with non-steady 1D gas dynamics.

6) Be able to calculate combustion waves.

TOPICS:

1) Kinetic theory: model, wall collisions, temperature and equation of state, mean free path, transport properties. (5 hours)

2) Free molecule flow: model, surface collisions, forces and heat transfer. (3 hours)

3) Thermodynamics: law of mass action, applications, thermo-dynamics of air. (4 hours)

4) One-dimensional flow: review steady 1-D flow, real gas flows, re-entry flow. (5 hours)

5) One-dimensional wave motion: propagating waves, Riemann Invariants, applications, explosion waves. (3 hours)

6) Additional applications: nozzles and diffusers, hypersonic flow. (5 hours)

ASSESSMENT:

1. Graded problems sets

2. Quiz and final

PROFESORADO:

Eberhardt David Scott. *Departamento Ingenierías Mecánica, Informática y Aeroespacial. Universidad de León.*