

Tribology

Friction and Lubrication

IDENTIFICATION

CODE : GM-4-S2-EC-MEFRL
ECTS : 3.0

HOURS

Lectures : 20.0 h
Seminars : 22.0 h
Laboratory : 0.0 h
Project : 0.0 h
Teacher-student
contact : 42.0 h
Personal work : 30.0 h
Total : 72.0 h

ASSESSMENT METHOD

written intermediate test (1 hrs) and
written exam (3 hrs)

TEACHING AIDS

numerical work space (Moodle2),
course notes and excercises

TEACHING LANGUAGE

French

CONTACT

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AIMS

KNOWLEDGE:

- friction phenomena, Hertz contact
- hydrodynamic lubrication
- elasto-hydrodynamic lubrication

Abilities:

- ca1: able to solve pde's
- ca2: performance analysis of a mechanical component
- ca3: choice of appropriate solution method

CONTENT

An introduction to tribology from a mechanical viewpoint, example lubrication of internal combustion engines. Outline of "dry" friction and the influence of contact parameters. Extension to lubricated contacts, Stribeck curve, study of thin films and the Reynolds equation. Study of lubrication regimes: hydrostatic, hydrodynamic and analysis of applications like journal bearings and thrust bearings. Introduction to elastohydrodynamic lubrication, application to bearings and gears, link between Stribeck curve and film thickness.

BIBLIOGRAPHY

- 1) Frêne J., Nicolas D., Degueurce B., Berthe D., Godet M., `Lubrification Hydrodynamique..., Paris Eyrolles 1990.
- 2) Johnson K.L., « Contact Mechanics », Cambridge University Press, 1985.
- 3) Dowson D., Higginson G.R., `Elastohydrodynamic Lubrication, the fundamentals of roller and gear lubrication..., Pergam. Press 1977

PRE-REQUISITE

contact mechanics, dimensional analysis, mathematics (pde)