

PHYS-734

Control and Operation of Tokamaks

Felici Federico, Moret Jean-Marc

| Cursus | Sem. | Type |
|---------------|-------------|-------------|
| Physics | | Obl. |

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| Language of teaching | English |
| Credits | 2 |
| Session | |
| Exam | Oral presentation |
| Workload | 60h |
| Hours | 40 |
| Courses | 16 |
| Exercises | 16 |
| TP | 8 |
| Number of positions | |

Frequency

Every 2 years

Remark

Every 2 years / Next time: Spring 2018 (Block course)

Summary

Obtain an understanding of the principal requirements for the control of high power tokamak pulses and to understand how these can be met by applying the basic principles of control theory.

Content

1. Overview of control requirements in a tokamak - current ITER design of plasma control
2. Basic principles of control theory - model types, identification, controllers, LTI, non-LTI
3. Design of controllers for plasma equilibrium control of ITER
4. Advanced issues related to ITER plasma shape control - constraints, optimisation
5. Design of controllers for kinetic control of 0-D quantities - energy and density, quantised actuators
6. Advanced issues related to kinetic control of 0-D quantities
7. Formulation of the control of continuous radial plasma profiles
8. Advanced issues related to profile control - actuator conflict
9. Stabilisation of MHD activity and current research work
10. Issues related to the control of the plasma-wall interactions - divertor, wall contact
11. Overview of the state of the art in the field and future tendencies in ITER

Resources**Websites**

- <http://crpp.epfl.ch>