



ETP

Institute of Electrotechnology

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Leibniz  
Universität  
Hannover



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## **UIE Intensive Course for PhD Students on *Design Optimization in Induction Heating, Electromagnetic Steering and Optimal Control of Induction Heating Processes***

**Hannover, May 31 - June 6, 2017**

**Institute of Electrotechnology (ETP), Leibniz Universität Hannover**

### **Introduction**

The aim of the course is to bring together up to 15 PhD students from European Universities and PhD students from the host institution to take part at intensive courses on **design optimization in induction heating, electromagnetic steering and optimal control of induction heating processes** and to work together in theoretical and experimental work as well as in mathematical modelling and numerical simulation. The students will participate in lectures, discuss their own scientific topics and existing problems under the guidance of well-experienced supervisors in order to take profit for their research studies.

The 6-days programme of the Intensive Course for PhD students (see below) gives the general guidelines, whereas the participants themselves according to their interests could also develop the details of the contents. As a result of this process, the created working groups have to carry out the chosen small projects and to present the received results finally.

The project oriented teaching and learning is the basic idea of this kind of intensive course, where the interests of the PhD students are in the centre of the activities. Not only passive listening but also active participation in the work is expected.

### **About the Host Institution**

The research and development activities of the Institute of Electrotechnology are focused on the electromagnetic processing of materials in particular induction heating and melting processes. The description, calculation and optimisation of non-linear electrothermal systems are in the centre of the activities. Many of the projects are performed in close cooperation with industrial partners and other research institutes. The activities reach from application oriented pure research to industrial development projects.

The existing technical equipment includes experimental installations, laboratories and high performance computer systems.

### **Useful Further Information**

#### **Participation Fee**

The participation fee is 350,- EUR and includes course materials, coffee breaks, lunches and evening events (as described in the PhD course program) and the full participation to XVIII International UIE-Congress 2017 which will be held directly after the PhD course.

#### **Contact Address**

##### **Institute of Electrotechnology**

Wilhelm-Busch-Str. 4

D- 30167 Hannover

Germany

Phone: +49 511/ 762 – 28 72 / 3248

Fax: +49 511 / 762 – 32 75

E-Mail: [uie2017@etp.uni-hannover.de](mailto:uie2017@etp.uni-hannover.de)

Internet: [www.uie2017.org](http://www.uie2017.org)

[www.etp.uni-hannover.de](http://www.etp.uni-hannover.de)

#### **Dead-line for Application**

**February 28, 2017**

## Programme

### Wednesday, 31.05.17

17:00 - 20:00 Registration and Welcome Get Together at ETP

### Thursday, 01.06.17

09:00 - 09:15 Opening, Welcome and Introduction to the Course Programme (Prof. E. Baake)

09:15 - 10:00 Presentation of the Institute of Electrotechnology (ETP) (Prof. B. Nacke)

10:00 - 10:30 Presentation of the Department of Control and System Analysis, State Technical University of Samara (Prof. Y. Pleshivtseva)

10.30 - 12:00 Short presentation of their research topics by the PhD students (10 minutes each)

12:00 - 13:30 Lunch at the Mensa of LUH

13:30 - 15:00 Short presentation of their research topics by the PhD students (10 minutes each)

15:00 - 15:30 Coffee break

15:30 - 16:00 Forming of 3 working groups on the basis of the presentations, taking into account the fields of interest and the personal wishes of the participants. The existing common research interests will be evaluated as well. Short introduction to the working program.

The 3 working groups are oriented to three different topics:

**A. Design Optimization in Induction heating** (supervisor: Prof. B. Nacke)

**B. Electromagnetic steering** (supervisor: Prof. E. Baake)

**C. Optimal Control of Induction Heating Processes** (supervisor: Prof. Y. Pleshivtseva)

16:00 - 17:30 Tour around the laboratories of ETP (Prof. E. Baake / Prof. B. Nacke)

17:30 Barbecue in the yard in front of ETP

### Friday, 02.06.17

09.00 - 12.30 Presentations of the 3 topics by the supervisors of the groups:

**A. Design Optimization in Induction heating** (Prof. B. Nacke)

Introduction, theoretical background, scientific state of the art, calculation methods, design rules, selected examples of practical applications and problems.

**B. Electromagnetic Steering** (Prof. E. Baake)

Introduction, theoretical background, calculation methods, design rules, selected examples of practical applications and problems.

**C. Optimal Control of Induction Heating Processes** (Prof. Y. Pleshivtseva)

Introduction, theoretical background, scientific state of the art, calculation methods, design rules, selected examples of practical applications and problems.

Coffee break in between

The main aim of the presentations is to give all participants the same level of knowledge in the different topics, to create further interest and to stimulate them for the work in the groups.

12:30 - 14:00 Lunch at the Mensa of LUH

14:00 - 15:30 The 3 different groups start to work in parallel under the guidance of the supervisors.

The detailed contents of the work in the groups are defined primarily by the supervisors but it can be influenced by the participants.

15:30 - 16:00 Coffee break

16:00 - 17:30 Continuation of project work in the different groups

19:00 Walk through the Old Town of Hanover including visiting of a local pub

### **Saturday, 03.06.17**

09:00 - 12:00 Continuation of project work in the different groups  
Coffee break in between

12:00 - 13:30 Lunch at a restaurant near ETP

Afternoon free time

**Sunday, 04.06.17** Free time

### **Monday, 05.06.17**

09:00 - 12:00 Continuation of project work in the different groups  
Coffee break in between

12:00 - 13:30 Lunch at the Mensa of LUH

13:30 - 17:00 Finalizing the project work and preparation of presentations by the 3 groups

Coffee break in between

Free evening

### **Tuesday, 06.06.17**

09:00 - 09:30 Presentation and discussion of the results by group **A. Design optimization in induction heating**

09:30 - 10:00 Presentation and discussion of the results by group **B. Electromagnetic steering**

10:30 - 11:00 Presentation and discussion of the results by group **C. Optimal control of induction heating processes**

11:00 - 11:30 Coffee break

11:30 - 12:00 Final discussion

12:00 - 12:30 Distribution of certifications and closing remarks

12:30 - 14:00 Lunch at the Mensa of LUH

### **End of the UIE Intensive Course for PhD Students**

18:00 - 21:00 Registration and Welcome Reception at UIE-Congress 2017