MPTL-11 Workshop

Modelling in the context of the SUPERCOMET 2 Project

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Abstract - 1

During the EU project Superconductivity Multimedia Educational Tool, phase 2 (SUPERCOMET 2), materials developed in the previous SUPERCOMET project have been tried out by partners since 2005.

A teacher seminar presents hands-on activities in combination with interactive animations, text and video presenting electromagnetism and superconductivity with an accompanying teacher guide. The materials are translated/adapted and tried out at schools in 15 European countries.

Abstract - 2

The project aims to develop new electronic learning modules connected to superconducting materials and applications of superconductivity during 2006 and 2007.

The project also aims to develop a kit of materials for the hands-on demonstrations and experiments with high-temperature superconductors requiring cooling with liquid nitrogen that can be carried out by pupils and teachers in upper secondary school.

Abstract - 3

After a brief introduction of the project's current status and a presentation of activities by different partners, the presentation will discuss different approaches to modelling in the context of the project materials, based on the recent workshop during GIREP 2006 in Amsterdam and subsequent project meetings and contributions.

Project status

Teacher seminar	Translated & tried out in most countries.
Computer application	Translated & tried out in most countries. New modules under development.
Hands-on kit hi-tech	Making, testing and measuring superconductors. Prototype ready soon.
Hands-on kit low-tech	Draft list of contents discussed. Upcoming workshop for prototyping.
Teacher guide	Translated/adapted by some partners. Will be updated in coming months.
Classroom posters	Not written yet, based on modules.
Intranet	In use by partners.
Extranet	Recently implemented new version.
Online community	Implemented, but not used much yet.

Partner activities

Computer application	Modules "Applications of superconductivity" and "Superconducting materials" written by University of Ludwigsburg, Simplicatus and University of Rousse
	Modules "Introduction to superconductivity" and "Explanation of superconductivity" written by Simplicatus with Universities of Munich, Ludwigsburg and Graz
Hands-on kit low-tech	Workgroup headed by PAP Workshop 12-13 October in Udine
Hands-on kit hi-tech	Workgroup headed by Loughborough Univ. Workshop in Antwerp, Nov 2006
Teacher seminar	Workgroup headed by University of Antwerp Workshop in Loughborough, February 2007
Teacher guide	Workshop in Graz, March 2007
Modelling / simulations	Workshop in Murcia, April 2007

Mental models of physical phenomena

The project presents different mental models for understanding electromagnetic phenomena, e.g. the particle model and the electron drift model.

The Bohr model has been chosen for a simple graphical representation of metal atoms and ions in the lattice when illustrating electric conduction.

Research on the use of such mental models in learning has been done by the universities of Udine, Rousse and Ostrava.

Numerical modelling with spreadsheet

One useful tool for exploration of numerical modelling as a part of the learning process is the spreadsheet, and the project will provide examples of this in the teacher guide, developed by the New University of Lisbon.

Simulations based on numerical models

Most of the animations previously developed by the project are not based on numerical models, but qualitative representations of mental models.

A sample Easy Java Simulation will be made by the University of Murcia, and project partners will discuss how to extend this work with further funding in a future project.

References

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Nancheva N., Stoyanov S. (2005): Simulations laboratory in Physics Distance Education. Proceedings from MPTL-10 Workshop, EPS (Berlin)

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Project participants at MPTL-11

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