

Secondment Report Form

Seconded	Marcin Wielichowski
Host Organization	Id: EPFL
	Name: École Polytechnique Fédérale de Lausanne
Research Topic(s)	Electromagnetic wave transmission through general stratified media including plasmas and metamaterials

ACTIVITIES DURING THE SECONDMENT

During the six months of the secondment, I was dealing with the electromagnetic wave propagation in multilayer planar structures containing media of arbitrary values of the constitutive parameters (electric permittivity and magnetic permeability). In particular, my work was focused on:

- collecting detailed data concerning the theoretical treatment of the subject,
- allowing the support for double-negative media (a.k.a. negative-index media; metamaterials),
- creating an educational software aimed at the visualization of the theoretical analysis.

Whereas the analysis of multilayer structures that only consist of double-positive media, is considered a standard procedure, a similar analysis in the case of structures with double-negative as well as single-negative amplifying media, contains subtleties that are not commonly considered in theory or implemented in scientific software. From between the two mathematically correct solutions allowed by Maxwell's equations in each layer of the structure, only one, physically meaningful solution needs to be selected (in fact, the selection is critical only for the two outmost layers). In general, the base for such a selection is provided by the physical requirement of causality. Technical details of an appropriate algorithm are studied in the literature.

During the secondment, a software working in the Matlab environment was created. Besides programmatically implementing the theoretical analysis, the software allows the visualization of concepts involved in the theory. The visualization together with strong interactive capabilities of the software are provided for mainly educational purposes. It was assumed that using such an approach, the understanding of physical phenomena and of the theoretical analysis can be significantly enhanced.

A detailed description of the results attained by me during the secondment, is given in the document included as attachment to this report (*Marcin-Wielichowski_Results.pdf*).

The results will be presented at the EuCAP'2012 conference, 26-30 March 2012, Prague.

MAIN RESULTS OF THE STAY

< List of the publications co-written (or in progress)>

Number of Publications: <u> 1 </u>	Other(s): (1) _____ _____
Number of Documents/ Reports: <u> 0 </u>	(2) _____ _____
Number of Case Studies & Demonstrators: <u> 0 </u>	(3) _____ _____

* Attach all relevant documentation that specifies your results

FORECAST ACTIVITIES

<Are there any envisaged activities following this secondment project, new collaborations, co directed PhD, etc>

A PhD student at LEMA will use the results in his research.

The software developed during the secondment is planned to be used as teaching aid in students' laboratory.

In order to improve CARE's secondment program, please fill this short questionnaire. Use the space at the end to expand your answers, if needed. Our aim is to improve the general experience for secondees in future.

Disagree < > Agree

GENERAL

My objectives were achieved.	1	2	3	4 x
The research topics were relevant to my work.	1	2	3	4 x
I benefited from being part of a wider research culture.	1	2	3	4 x

HOST ORGANIZATION

I am satisfied with the quality and quantity of supervision I received.	1	2	3	4 x
I had access to adequate resources to support my research..	1	2	3	4 x

SECONDMENT PROGRAM

I would recommend this secondment programme to others.	1	2	3	4 x
I believe the skills I have learned will help me to improve my job/research.	1	2	3	4 x
I would apply to another programme similar to CARE.	1	2	3	4 x
In general, how would you classify the CARE Secondment Programme?	1	2	3	4 x

Other questions/comments to be potentially considered: _____

SIGNATURES

Candidate Marcin Wielichowski

Date: 2011/01/31
(year/month/day)

Signature _____