



ABCDE



Scientific Report

First name / Family name

Giuseppe Papari

Nationality

Italian

Name of the *Host Organisation*

INRIA

First Name / family name
of the *Scientific Coordinator*

Isabelle Herlin

Period of the fellowship

01/07/2011 to 30/06/2012



I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

The main track of my scientific research during my fellowship focuses on reduced models for data simulation and assimilation. In particular, new families of basis functions for image projection have been developed, by minimizing certain cost functions and imposing boundary conditions and other constraints (divergence-free, curl-free, ...). It has been proved that the optimal basis functions are equal to the eigenfunctions of a suitable quadratic functional.

In addition, a discretization algorithm to compute the required basis function has been implemented. The algorithm works with any irregular point set and reduces the computation of the wavelets to the evaluation of the eigenvectors of a sparse matrix.

In parallel, work on active contours with prior statistical shape information has been carried out. In particular, the concept of tension within an active contour is carried out, which is based on the observation that on a local minimum of the cost functions the internal and external driving forces perfectly balance each other but they are not exactly zero. Based on this concept, a minimization algorithm for active shapes has been provided, which avoids undesired local minima of the concerned cost function.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

G. Papari, Tension in active shapes, IEEE Transactions on image processing (under review)

III – ATTENDED SEMINARS, WORKSHOPS, CONFERENCES

ABCDE Seminar at FhG Berlin-Adlershof, 10-11 November 2011

IV – RESEARCH EXCHANGE PROGRAMME (REP)

The following ERCIM institutes have been visited during the concerned fellowship:

- University of Luxembourg, Interdisciplinary center for security, reliability and trust, December 14th – 16th, 2011
- Norwegian University of Science and Technology, department of Computer and Information Science, January 30th – February 10th, 2012
- University of Fribourg, department of Informatics, June 13th - 15th, 2012