



EUROPEAN COMMISSION
RESEARCH DG HUMAN RESOURCES
AND MOBILITY

TOK Periodic Activity Report

Project No: 14508

Project Acronym: SPADE2

Project Full Name: DETERMINISTIC AND STOCHASTIC
DYNAMICS, FRACTALS, TURBULENCE

Marie Curie Actions

TOK Periodic Activity Report

Period covered: from 01/09/2008 to 31/08/2009

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Project coordinator name:
Prof Feliks Przytycki

Duration: 48

Project coordinator organisation name:
Institute of Mathematics of the Polish Academy of
Sciences

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Marie Curie Actions

TOK Periodic Activity Report

GENERAL INFORMATION

Project No:	14508
Project acronym:	SPADE2
Project full name:	DETERMINISTIC AND STOCHASTIC DYNAMICS, FRACTALS, TURBULENCE
Period number:	4th
Period covered - start date:	01/09/2008
Period covered - end date:	31/08/2009
Project start date:	01/09/2005
Project duration [months]:	48
Project coordinator name:	Prof Feliks Przytycki
Project coordinator organisation name:	Institute of Mathematics of the Polish Academy of Sciences
Date of submission:	15/10/2009

SUMMARY OF THE RECRUITMENT DURING THE REPORTING PERIOD

Coordinator: Institute of Mathematics of the Polish Academy of Sciences

Name of the Researcher (as stated at time of selection)	Experience	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months covered by this recruitment during the reporting period
			Country	LFR					
Peter Imkeller	MER (> 10 years)	Incoming	DE-Germany	No	Male	01/10/2008	31/10/2008	Full Time	1.0
Vlodymir Fonf	MER (> 10 years)	Incoming	IL-Israel	No	Male	09/10/2008	08/11/2008	1.0	Full Time
Thomas Persson	ER (4-10 years)	Incoming	SE-Sweden	No	Male	01/05/2009	31/08/2009	4.0	Full Time
Maria Roginskaya	MER (> 10 years)	Incoming	SE-Sweden	No	Female	26/11/2008	25/12/2008	1.0	Full Time
Stefano Olla	MER (> 10 years)	Incoming	FR-France	No	Male	01/04/2009	31/05/2009	2.0	Full Time
Zbigniew Brzezniak	MER (> 10 years)	Incoming	UK-United Kingdom	No	Male	01/07/2009	31/08/2009	2.0	Full Time
M-Barek Adioui	ER (4-10 years)	Incoming	FR-France	No	Male	06/07/2009	20/07/2009	0.5	Full Time
Vlodymir Fonf	MER (> 10 years)	Incoming	IL-Israel	No	Male	27/03/2009	26/04/2009	1.0	Full Time
Maria Roginskaya	MER (> 10 years)	Incoming	SE-Sweden	No	Female	13/05/2009	12/06/2009	1.0	Full Time

Training Partner: The University of Warwick

Name of the Researcher (as stated at time of selection)	Experience	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months covered by this recruitment during the reporting period
			Country	LFR					
Szymon Peszat	MER (> 10 years)	Outgoing	PL-Poland	Yes	Male	01/02/2009	30/04/2009	Full Time	3.0
Jerzy Zabczyk	MER (> 10 years)	Outgoing	PL-Poland	Yes	Male	01/02/2009	30/04/2009	Full Time	3.0

Training Partner: Universite Pierre et Marie Curie - Paris 6

Name of the Researcher (as stated at time of selection)	Experience	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months covered by this recruitment during the reporting period
			Country	LFR					

Training Partner: Scuola Normale Superiore di Pisa

Name of the Researcher (as stated at time of selection)	Experience	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months covered by this recruitment during the reporting period
			Country	LFR					

Training Partner: L'Institut National de Recherche en Informatique et en Automatique

Name of the Researcher (as stated at time of selection)	Experience	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months covered by this recruitment during the reporting period
			Country	LFR					
Wojciech Krynski	ER (4-10 years)	Outgoing	PL-Poland	Yes	Male	15/04/2009	14/05/2009	Full Time	1.0
Wojciech Krynski	ER (4-10 years)	Outgoing	PL-Poland	Yes	Male	01/06/2009	30/06/2009	Full Time	1.0

Training Partner: Christian-Albrechts Unversitaet zu Kiel

Name of the Researcher (as stated at time of selection)	Experience	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months covered by this recruitment during the reporting period
			Country	LFR					
Wojciech Zajackowski	MER (> 10 years)	Outgoing	PL-Poland	Yes	Male	20/04/2009	19/06/2009	Full Time	2.0
Tomasz Cieslak	ER (4-10 years)	Outgoing	PL-Poland	Yes	Male	23/02/2009	22/03/2009	Full Time	1.0
Tomasz Cieslak	ER (4-10 years)	Outgoing	PL-Poland	Yes	Male	12/06/2009	11/07/2009	Full Time	1.0

TOTAL PMM PER CONTRACTOR**Coordinator:** Institute of Mathematics of the Polish Academy of Sciences**No. of full-time equivalent months to be delivered according to the contract:** 0

No. of full-time equivalent months covered by this recruitment during this reporting period

13.5

Training Partner: The University of Warwick**No. of full-time equivalent months to be delivered according to the contract:**

No. of full-time equivalent months covered by this recruitment during this reporting period

6.0

Training Partner: Universite Pierre et Marie Curie - Paris 6**No. of full-time equivalent months to be delivered according to the contract:**

No. of full-time equivalent months covered by this recruitment during this reporting period

0.0

Training Partner: Scuola Normale Superiore di Pisa**No. of full-time equivalent months to be delivered according to the contract:**

No. of full-time equivalent months covered by this recruitment during this reporting period

0.0

Training Partner: L'Institut National de Recherche en Informatique et en Automatique

No. of full-time equivalent months to be delivered according to the contract:

No. of full-time equivalent months covered by this recruitment during this reporting period
2.0

Training Partner: Christian-Albrechts Unversitaet zu Kiel

No. of full-time equivalent months to be delivered according to the contract:

No. of full-time equivalent months covered by this recruitment during this reporting period
4.0

TOTAL PMM FOR ALL PARTNERS

No. of full-time equivalent months to be delivered according to the contract	No. of full-time equivalent months covered by this recruitment during this reporting period
0.0	25.5

GENERAL PROGRESS OF THE PROJECT

Please indicate if the project

a) is, at this stage, being implemented as originally planned

If you answered b) or c) please include a detailed description of the modifications in the report

Qualitative indicators of progress and success

The programme was organized in 4 tasks.

1. Dynamical systems. In iteration of complex rational functions, applying thermodynamical formalism F. Przytycki and J. Rivera-Letelier proved the existence of good equilibria and the analyticity of geometric pressure function between standard "freezing" and "condensation" parameters for large classes of weakly hyperbolic maps. L. Jaksztas in cooperation with M. Zinsmeister studied the dependence of Hausdorff dimension of Julia set on parameter. J. Kotus, W. Bergweiler, A. Zdunik, K. Baranski et al. gave estimates of Hausdorff dimension of escaping points for entire and meromorphic maps. A. Zdunik, M. Szostakiewicz and M. Urbanski proved several stochastic properties of equidistributed measure for iteration of rational functions in dimension bigger than 1. In multifractal analysis in dimension bigger than 1, M. Rams and T. Jordan has been working on McMullen's carpets studying Hausdorff and packing dimension spectra for local dimension of Bernoulli measures. M. Rams with J. Levy-Vehel finalized their study of large deviation analysis of data transmission processes. T. Persson (incoming) studied classes of conformal fractals with large Hausdorff dimension in relation with number theory. R. Rudnicki with M'B. Adiou presented a model of blood stem cells production exhibiting chaotic dynamics.

2. PDE's, turbulence, asymptotics. Most works concerned Navier-Stokes Equations (NSE). In a remarkable "Random attractors for stochastic 2D Navier-Stokes equation in some unbounded domains" by Z. Brzezniak (incoming), G. Lukaszewicz et al. the existence of a unique attractor is proved. P. Mucha wrote a series of papers containing an analysis of weak solutions to the compressible NS-systems, structure of stationary solutions and transport equations. W. Zajackowski (outgoing to CAU Kiel) with J. Renclawowicz and B. Nowakowski studied non-stationary flow in cylindrical domains governed by NSE, existence of regular solutions. In other topics G. Lysik obtained Gevrey estimates for formal solutions of evolutions equations.

3. Stochastic Processes. Task was especially active with incoming Z. Brzezniak, P. Imkeller, S. Olla and outgoing S. Peszat and J. Zabczyk (both to Warwick). They collaborated e.g. with D. Elworthy and S. Assing. Some remarkable results are obtained by: S. Peszat: - existence of weak and strong cadlag solutions of infinite systems of linear equations; Peszat and S. Tindel - on stochastic heat and wave equations on a Lie group; T. Peszat and L. Ryzhik - on fluctuations of the solution of the Wigner equation; T. Komorowski, S. Peszat, T. Szarek - on invariant measures for a Markov process. The last result applies to the evolution for the velocity field in the passive tracer model. The team organized a SPADE2 international workshop on Stochastic Analysis in Cracow. J. Zabczyk wrote a series of papers with Brzezniak, E. Priola (short visits at IMPAN), B. Baran et al. on solutions to stochastic PDE's perturbed by discontinuous processes. Some have applications to mathematical finance.

3a. In symplectic structures sub-task S. Janeczko and Z. Jelonek classified some symplectic manifolds and their structure groups. W. Krynski (outgoing to INRIA) wrote papers on geometry of ODE's, exhibiting classification of dynamical pairs and conformal structures on the solution space.

4. Function Spaces. In approximation theory A. Kamont continued her study of Franklin systems. In Banach spaces area T. Figiel, W. B. Johnson, and A. Pelczynski studied approximation properties of Banach spaces and Banach lattices (Isr. J. Math.). On the border of approximation theory and computer science remarkable are results by P. Wojtaszczyk: "Stability of l_1 minimisation in compressed sensing" and "Stability and instance optimality for Gaussian measurements in compressed sensing", to appear in Foundation of Computational Mathematics.

A special SPADE2 summerising workshop was organized at IMPAN in May 14-18, where main achievements were presented by several SPADE2 fellows and invited guests.

PROJECT ACHIEVEMENTS

Scientific highlights

The programme was organized in 4 main Tasks.

1. Dynamical Systems.

„Incoming" T. Persson studied classes of subsets of conformal fractals, that are closed under countable intersections, and have large Hausdorff dimension. These classes generalize Falconer's ones and have found applications in metric number theory and dynamical systems.

K. Baranski and M. Misiurewicz in [BM] studied the Stein-Ulam Spiral map of the 2-dimensional simplex to itself which arises in the theory of population genetics. They proved that for the points from a residual subset of the simplex the limit set is equal to the boundary of the simplex, answering an old question by Y. Lyubich.

Interesting results on analyticity of multifractal spectra for Lyapunov exponents and local dimensions were obtained by K. Gelfert, F. Przytycki and M. Rams in "Lyapunov spectrum for rational maps".

In population dynamics R. Rudnicki worked out in [Ru] a structured model of stem cells given by a partial differential equation. This equation generates a semiflow acting on the set of densities which possesses an invariant exact measure positive on open sets.

During his second part of stay in Katowice IMPAN branch M'B. Adiou continued his collaboration with R. Rudnicki on the study of asymptotic behaviour of a model responsible for the aggregation process.

This package in cooperation with CODY and national programs ran a Spring School in Dynamical Systems in Bedlewo IMPAN Conference Center with participation of about 50 young Polish Phd and graduate students.

2. PDE's, Turbulence, Asymptotics.

During his visit to CAU Kiel W. Zajaczkowski cooperated with a number of german mathematicians (M. Braack - CAU, R. Farwig - Darmstadt Univ., V. Varnhorn - Cassel Univ., R. Picard - Dresden Univ.) on problems of regularity of special global solutions to the NSE in cylindrical and axially symmetric domains.

The main results by P. Mucha and M. Pokorný [MuP] is the existence of a weak solution to steady compressible heat conducting viscous fluid in a bounded three dimensional domain governed by the compressible Navier-Stokes-Fourier system for arbitrarily large data. Additionally P. Mucha studied in [Mu] fundamental problems for the transport equation.

T. Cieslak devoted his visit in CAU Kiel to two main activities. On one hand he learned differential geometry, necessary for the study of measure solutions to Euler equation, and Kelvin-Helmholtz instabilities which are important from the point of view of appearance of turbulence. On the other hand he was trying to see if the methods introduced by him together with P. Laurencot to study the occurrence of singularity for Smoluchowski-Poisson models could be applied to gain some knowledge about the singularities in hydrodynamics.

3. Stochastic Processes, Scaling Limits.

"Incoming" S. Olla continued collaboration with T. Komorowski on heat transport, radiation equality, scaling. A joint book is in preparation. As results of this cooperation and resulting Warsaw-Lublin seminars double doctorates, with two (Polish and French) advisors are in preparation.

Investigations of "incoming" P. Imkeller - together with IMPAN mathematicians J. Zabczyk and S. Peszat - centered around applications of SDE and SPDE with Gaussian and Levy noise to physical, especially climate models, as well as models in stochastic finance.

Very fruitful was the cooperation of "incoming" Z. Brzezniak with J. Zabczyk, S. Peszat and P. Imkeller. In their joint paper "Time irregularity of generalized Ornstein-Uhlenbeck processes" - devoted to applications to mathematical finance - they showed that solutions of some important stochastic partial differential equations perturbed by discontinuous processes do not have solutions without discontinuities of the second order.

Also Z. Brzezniak together with J. Zabczyk studied in depth spatial regularity of stochastic parabolic equations.

During his visit in Warwick S. Peszat established the existence of weak and strong cadllad versions of solutions to infinite systems of linear equations driven by independent Levy processes.

With respect to "Scaling Limits" and related physical processes, a School "Analysis on Metric Spaces and Quasiconformal Structures" and a Conference in cooperation (and financed by) CODY took place including minicourses by M. Zinsmeister, D. Chelkak, P. Nolin and B. Duplantier including: growth processes, Ising model and introduction to Stochastic Loewner Evolution.

3a. Symplectic Structures.

During his visit at INRIA W. Krynski worked on geometry of ODEs and control systems. He solved the problem of equivalence of so-called dynamical pairs and exhibited new connections between ODEs and para-conformal structures on their solution spaces.

S. Janeczko and Z. Jelonek characterized in [JJ] general symplectic manifolds and their structure groups through family of isotropic or symplectic submanifolds and their diffeomorphic invariance obtaining a complete geometric characterization of symplectic diffeomorphisms and a reinterpretation of symplectomorphisms as diffeomorphisms acting purely on isotropic or symplectic submanifolds.

4. Function Spaces.

A. Kalamajska discussed in [Ka1] the possibility of modification of a sequence of Sobolev functions in such a way that the new sequence has the prescribed trace and their gradients generate the same DiPerna Majda measure. Also together with K. Pietruska-Paluba they studied in [KaPP] weighted Hardy-type inequalities in Orlicz spaces.

In [GKa] for general Franklin systems corresponding to sequences of knots satisfying certain conditions on structure (quasi-dyadic structure) and regularity A. Kamont and G. Gevorkyan derived a condition on sequence of coefficients of a general Franklin series, under which the property of the uniqueness of series holds.

"Incoming" M. Roginskaya together with M. Wojciechowski have found an analogue of Whitney decomposition of a planar domain which take into account the structure of the boundary of the domain. This result allowed them to show Bounded Approximation Property for the one-connected domains with no restrictions on the smoothness of their boundary.

In the paper [Wjt] by P. Wojtaszczyk, resulted from his stay in Paris 6 in 2005, it is shown that in the case of Gaussian measurements, l_1 minimization recovers the signal well from inaccurate measurements, thus improving the results of A.Cohen, W.Dahmen, R.DeVore (J. Am. Math.Soc. 22 (2009), 211-231) and Candes-Romberg- Tao (Comm. Pure Appl. Math. 59 (2006), 1207-1223). A numerically feasible algorithm is constructed, too. The transfer of this topic in Poland put us in the world front line with P. Wojtaszczyk becoming a leading specialist.

Teaching and training activities

The achievements of the project were presented and discussed on several seminars, courses, workshops and conferences gathering specialists and PhD students from IMPAN, cooperating Polish institutions and foreign visitors.

In particular, in May 2009 we organized 5 days SPADE2 workshop „Deterministic and Stochastic Dynamics, Fractals, Turbulence" where several „fellows" and invited guests presented results obtained during the program. Among the speakers were: P. Imkeller, E. Priola, M. Rams, A. Zdunik, K. Oleszkiewicz, T. Komorowski, P. Mucha, M. Arnold, G. Lukaszewicz, V. Ryazanov, W. Zajaczkowski, M. Roginskaya, M. Wojciechowski, J. Renclawowicz and L. Lysik.

Furthermore, the results of the SPADE2 were presented at:

* IMPAN and Warsaw University seminar "Dynamical Systems": M. Rams, T. Persson, L. Kotus, L. Jaksztas, K. Baranski, A. Zdunik.

* Seminar „Mathematical Biology" at IMPAN: R. Rudnicki, J. Tiuryn.

* IMPAN and Warsaw University Seminars "PDE's and Fluid Dynamics" and "Navier-Stokes Equations and PDE's": B. Nowakowski, P. Mucha, W. Sadowski, G. Lukaszewicz, W. Zajaczkowski, J. Renclawowicz.

* Seminar "Analytic Theory of Differential Equations" at IMPAN: G. Filipuk, G. Lysik, S. Michalik.

* Seminars at IMPAN "Financial Mathematics and Stochastic Processes" about 20 participants.

* Seminar „Nonholonomic Geometry and Control Systems" at IMPAN: B. Jakubczyk, W. Krynski.

* "Seminar on Singularities" at Warsaw Technological University: S.Janeczko, Z. Jelonek, W. Domitrz.

- * Seminar „Functional Analysis" at IMPAN: M. Wojciechowski, A. Kamont, A. Pelczynski, T. Figiel, P. Wojtaszczyk, P. Mankiewicz.
- * "Seminar for PhD students", about 30 participants.
- * "Spring School of Dynamical Systems 2009", Bedlewo: lectures by: F. Przytycki, J-P. Conze, J. Mierczynski, D. Wilczak, E. Gutkin, about 50 young Polish participants.
- * Conference „Nonlinear Parabolic Problems", Bedlewo: lectures by: T. Cieslak, J. Renclawowicz, W. Zajaczkowski.
- * Research group „Partial Differential Equations with Random Perturbations": J. Zabczyk, E. Priola, S. Peszat.
- * School and conference „Geometric Singularity Theory" S. Janeczko, G. Ishikawa.
- * School "Analysis on Metric Spaces and Quasiconformal Structures" with courses by P. Hajlasz, P. Koskela, G. Swiatek, X. Tolsa and M. Zinsmeister.
- * Conference "Conformal Structures and Dynamics" with mini-courses by M. Zinsmeister, D. Chelkak, P. Nolin and B. Duplantier.

Dissemination of results

Publications written within the SPADE 2 program in 2008/09

1. Dynamical Systems

- [BM] K. Baranski, M. Misiurewicz, "Omega-limit sets for the Stein-Ulam spiral map"
- [J] L. Jaksztas, "On the derivative of the Hausdorff dimension of the quadratic Julia set II"
- [HKK] J.Hawkins, L.Koss, J.Kotus, "Elliptic functions with critical orbits approaching infinity", J. Difference Equ. Appl., accept.
- [BK] W.Begweiler, J.Kotus, "On the Hausdorff dimension of the escaping set of certain meromorphic functions" - subm.
- [Per] D. Farm and T. Persson, "On Falconer classes with holes".
- [MJ] M. Rams, T. Jordan, „Multifractal analysis for Bedford-McMullen carpets"
- [AR] M Adioiu, R. Rudnicki, "Asymptotic behavior of an integro-differential model with a convolution term responsible for the agregation process".
- [Ru] R. Rudnicki, "Chaoticity of the blood cell production system", Chaos, in press.

2. PDEs

- [BCLL] Z. Brzezniak, T. Caraballo, J.A. Langa, Y. Li, G.Lukaszewicz, and J. Real, "Random attractors for stochastic 2D-Navier-Stokes equations in some unbounded domains"
- [MP1] P. Mucha, M. Pokorny, "On the steady compressible Navier-Stokes-Fourier system", Comm. Math. Physics 288, 349-377 (2009).
- [Mu] P. Mucha, "Transport equation: extension of classical results for $\text{div } b$ in BMO " - subm.
- [RZ] J.Renclawowicz, W. Zajaczkowski, "Existence of solutions to the Poisson equation in L_p weighted spaces", - accep.
- [ZaN] W. Zajaczkowski, B.Nowakowski, "Global existence of solutions to Navier-Stokes equations in cylindrical domains, I, Appl.Math.36(2) (2009) 169-182. II, Appl.Math.36(2)(2009), 183-194.
- [Za3] W. Zajaczkowski, "Existence of solutions to the (rot, div) -system in L_2 weighted spaces", Appl. Math.36(1) (2009) 83-106 .
- [Za4] W. Zajaczkowski, "Large time existence of solutions to the Navier-Stokes equations in axially symmetric domains with inflow and outflow", Functiones Approx., 40(2)(2009) 209-250.
- [Kr1] W. Krynski, "On contact equivalence of systems of ordinary differential equations", subm.
- [Kr2] W. Krynski, "Conformal structures and differential equations", subm

3. Stochastic processes

- [Pe1] S. Peszat, "Cadlag version of an infinite-dimensional Ornstein-Uhlenbeck process driven by Levy noise",
- [PeTi] S. Peszat and S. Tindel, Stochastic heat and wave equations on a Lie group, Stochastic Anal. Appl., to appear.
- [KPR] T. Komorowski, S. Peszat, and L. Ryzhik, "Limit of fluctuations of solutions of Wigner equation", Comm. Math. Phys., to appear.
- [BrPe] Z. Brzezniak and S. Peszat, "Hyperbolic equations with random boundary conditions", in: Recent Developments in Stochastic Dynamics and Stochastic Analysis
- [BZ] Z. Brzezniak and J. Zabczyk, "Regularity of Ornstein-Uhlenbeck processes driven by a Levy white noise", Potential Analysis - to appear
- [PZ1] E. Priola and J. Zabczyk, "Structural properties of semilinear spde's driven by cylindrical stable processes", Probability Theory and Related Fields, to appear

[PZ2]. E. Priola and J. Zabczyk, "On linear evolution equations with cylindrical Levy noise", Proc. Conference on SPDES, Levico, 2008.

[BGIPZ] Z. Brzezniak, B. Goldys, P. Imkeller, S. Peszat and J. Zabczyk, "Time irregularity of generalized Ornstein-Uhlenbeck processes", subm.

[IJ] S. Janeczko, Z. Jelonek, "Diffeomorphisms preserving symplectic data on submanifolds", Proc. Steklov Math. Inst. (2009).

4. Function spaces

[Ka1] A. Kalamajska, "On one method of improving weakly converging sequence of gradients", Asymptotic Analysis, 62, (2009), 107-123.

[KaPP] A. Kalamajska, K. Pietruska-Paluba, "On a variant of Hardy inequality between weighted Orlicz spaces", Studia Mathematica, 193, (2009), 1-28.

[GKa] G.G. Gevorkyan, A. Kamont, "On the uniqueness of series with respect to general Franklin systems" - subm.

[FJP] T. Figiel, W. B. Johnson and A. Pelczynski, "Some approximation properties of Banach spaces and Banach lattices, Israel J. Math. -accepted

[Wj] M. Wojciechowski, "On the roots of the Fourier transform of singular measures"

[Wjt] P. Wojtaszczyk, "Stability and instance optimality for Gaussian measurement", Found. Comput. Math.

For Conference and University lectures see Annex1 SPADE2

ADDITIONAL INFORMATION

Please indicate any additional information, which may be considered useful to assess the work done during the reporting period. The socio-economic aspect of the project may be addressed in this section.

The Polish Ministry of Science and Higher education awarded the project a matching grant of about 450 000 euros. This grant is used to support short visits at IMPAN of foreign and Polish (from other cities) mathematicians and also short outgoing visits, substantial for the success of the program, supports schools and workshops, enables us also to buy some necessary computers, programs etc.

SPADE2 is cooperating with other FP6 Marie Curie programmes at IMPAN, in particular RTN "Conformal Structures and Dynamics" acr. CODY, that have started in January 2007, is coordinated at Warwick, and has a node at IMPAN.

Attachments	Annex I-09.doc
Name	
Date	
Signature	