Curriculum Vitae

Vuk MILISIC Ph.D. : Applied Mathematics

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Education

1998-2001 : Ph.D., speciality Applied Mathematics, University Bordeaux I.

1996-1997 : Ph.D. prelims, speciality Applied Mathematics and Scientific Computation, University of Bordeaux I, with distinction ("mention bien"), class 3rd.

1995-1996 : Master of Applied Mathematics and Scientific Computation, University Bordeaux I.

1994-1995 : Bachelor's degree of Applied Mathematics, University Bordeaux I.

1991-1993 : Minor of Mathematics and Informatics, University Bordeaux I.

Ph.D.

Title :	Discrete kinetic approximation of scalar boundary initial value problems.
Distinction :	"Tres honorable"
Date :	11th December 2001.
Laboratory :	Mathimatiques Appliquees de Bordeaux (MAB), University Bordeaux I.
Supervisors:	Denise Aregba-Driollet (Assistant MAB), Bernard Hanouzet (Professor MAB)
Scholarship :	Training period from September 1999 to September 2000, at "L'Instituto per le Applicazioni del Calcolo Mauro Picone" (IAC) Roma,
Supervisor:	Roberto Natalini (Research director)
Grant:	Pre-Doc grant in the framework of the European "TMR Hyperbolic Conservation Laws"

Started in 1997 by a two month training period at IAC, our collaboration has continued in recent years. In Rome, I improved my knowledge on hyperbolic problems in bounded domains. This material was necessary to publish my first article that generalizes the work of Roberto Natalini and Andrea Terracina on a simple relaxation model. At the same time, I started to collaborate with Andrea Terracina and Francesca Guarguaglini on the kinetic approximation of degenerate hyperbolic parabolic equations in the semi-bounded case. This work is continued in a short training period from April to August 2002, again at IAC.

Technical Skills

Mathematical and Numerical Modelling of multidimensional systems of PDE:

. Hyperbolic systems with Boundary Conditions (BC)

. Hyperbolic-Parabolic degenerate systems with BC

. Kinetic theory, BGK, discrete BGK models.

Computational Code of Fluids Mechanic:

. PHOENIX, FLUENT.

Informatics :

. Systems : Unix, Linux, Windows,

. Languages : Fortran 77, 90

. Mathematical software : Maple, Mathlab, Scilab.

. Visualisation software : Xmgr, Gnuplot, Vigie (INRIA)

Research

Publications:

1 "Stability and convergence of discrete kinetic approximations to an initial-boundary value problem for conservation laws" accepted in Proceedings of the A.M.S. 2001 summary:

We present some new convergence results for a discrete velocities BGK approximation to an initial boundary value problem for a single hyperbolic conservation law. In this paper we show stability and convergence towards an unique entropy solution in the general BV framework without any restriction either on the data of the limit problem or on the set of velocities of the BGK model.

2 "Kinetic approximation of a boundary value problem for conservation laws" in collaboration with Denise Arebga-Driollet (MAB University Bordeaux I), submitted to Numerische Mathematik summary:

We design numerical schemes for systems of conservation laws with boundary conditions. These schemes are based on relaxation approximations taking the form of discrete BGK models with kinetic boundary conditions. The resulting schemes are Riemann solver free and easily extendable to higher order in time or/and in space. Convergence is proved, for scalar equations. We show numerical examples, including solutions of the Euler equations.

These two publications are quite complementary: while the first treats the mathematical modelling of hyperbolic problems in a semi-bounded domain, the second, using numerical analysis, presents a more applied point of view. The next visit in Italy (see above) should bring new extensions of this work to the degenerate parabolic-hyperbolic case.

3 "A discrete BGK approximation for strongly degenerate parabolic problems with boundary conditions" in collaboration with Andrea Terracina (Universita "La sapienza" Roma I), and Francesca Guarguaglini ("Universitá degli Studi di L'Aquila").

We consider a BGK system with a finite number of velocities, depending on a positive relaxation parameter, that approximate strongly degenerate hyperbolic–parabolic equations with initial boundary condition. We prove a priori estimates for the solutions of the system, showing that this functions converge towards the entropy solution of a strongly degenerate problem when the parameter let to zero.

Oral communications :

1 "Discrete BGK Numerical schemes", 32nd Congress of Numerical Analysis (Canum 2000), Port d'Albret, June 2000,

2 "Convergence and stability for BGK system with boundary", Lectures on Kinetic Equations at ENS (Ecole Normale Sup rieure)., Lyon, 5-12 March 2001,

3 "Boundary value problem for conservation laws", 33rd Congress of Numerical Analysis (Canum 2001), Pompadour, 28 May - 1 June 2001,

4 "Kinetic approximation for conservation laws: the system case", Congress of Universities of Bordeaux, Toulouse and Pau. Anglet, 12 October 2001

5 "Discrete kinetic approximations of conservation laws", Seminar at the Imperial College, London, 25 january 2002

6 "Discrete kinetic approximations of initial boundary value problems of conservation laws", Talk given at EPFL (Ecole Polytechnique Federale de Lausanne), Switzerland, 18 march 2002

Professional / Research experience

- 1997-98: Scientist in the army during military service
- July-August 1997: Training period of two months at the M. Picone Institue (Rome): "Kinetic numerical schemes for hyperbolic systems of conservation laws". Supervisor: Roberto Natalini.
- July-September 1996: Training period of three months at the Institut de Mécanique des Fluides de Toulouse (IMFT), on the topic "Mathematical modelling of suspended matter transport using PHOENICS simulation code."
- July-September 1995: Training period at the laboratory Modelisation Avancée des Systemes Thermiques et Ecoulements Réels (MASTER) of the engineering school ENSCPB in Bordeaux "Modelling of a decanter using FLUENT simulation code."

Teaching

- 2000-2001: Lectures in the engineering school Ecole Supérieure des Technologies Avancées (E.S.T.I.A)
- sept 2001- april 2002: Temporary Teaching and Research Position (A.T.E.R.) at the university of Bordeaux I