CURRICULUM VITÆ

Kleomenis G. Tsiganis

Personal Data

Name:	Tsiganis
First Name:	Kleomenis
Date of Birth:	January 12, 1974
Place of Birth:	Larissa, Greece
Marital Status:	Single

Home Address:	Al. Symeonidi 6
City:	Thessaloniki
Country:	GREECE
Correspondence Address:	Laboratory of Astronomy Section of Astrophysics, Astronomy and Mechanics Department of Physics Aristotle University of Thessaloniki 54006 Thessaloniki GREECE

Tel:	+30 31 998141
Fax:	+30 31 995384
e-mail:	*tsiganis@astro.auth.gr*

1 Education

I received my undergraduate education from the Physics Department of the Aristotle University of Thessaloniki. During the last year of my studies I worked on the Diploma project entitled

"Numerical Simulations of YSO Jets - The effect of Kelvin-Helmholtz instabilities on Shock formation"

under the supervision of Prof. L. Vlahos. Most of this work was completed during my visit at the *School of Cosmic Physics, DIAS* in Dublin, Ireland, under the supervision of Prof. T. P. Ray. I graduated in September 1996 with a B.Sc. in Physics.

In October 1996 I began to work on topics of Non-linear Dynamics in collaboration with Prof. H. Varvoglis. In January 1997 I enrolled in the Graduate Program of the Physics Department. In August 1998, I undertook my Ph.D. project entitled,

"Transport in the phase space of Hamiltonian systems - applications in Celestial Mechanics"

for which I am currently working under the supervision of Prof. H. Varvoglis and in collaboration with Prof. J. Hadjidemetriou and Prof. S. Ichtiaroglou.

2 Research Interests

My research interests are in the field of Dynamics of Hamiltonian systems. In particular, I am interested in the statistical description of chaotic motion, i.e. the determination of the *transport process* that governs the evolution of distributions of trajectories in the phase space. I am working on Hamiltonian flows, but also on are-preserving maps, away from the "resonance-overlap" regime. In this case, the presence of large regions of ordered motion in the phase space, whose structure seems to possess *fractal* properties, favors the phenomenon of *stickiness.* This alters significantly the statistical properties of the transport process so that, instead of *normal diffusion*, the process resembles a *fractal random walk* (Levý-like process). I am trying to modify the Fokker-Planck equation, by defining appropriate diffusion coefficients, so that *anomalous transport* is also taken into account.

The Hamiltonian systems I am mostly interested in are several variants of the restricted three-body problem, as well as more advanced models describing the motion of small bodies in the Solar system. We follow the evolution of individual trajectories (fictitious asteroids) as well as distributions of particles, initially lying in several regions of the action-space subset covered by the asteroid belt. In this way, we monitor the statistical properties of the belt, in an effort to explain its present structure, its depletion and, finally, strange phenomena recently seen, such as asteroids exhibiting *stable chaos.*

3 Titles

- B.Sc. in Physics, September 1996

4 Membership in Societies

- Hellenic Astronomical Society (HEL.A.S.), 1997

5 Research Visits

- February 1996 - July 1996, School of Cosmic Physics, Dublin Institute for Advanced Studies, Dublin, Republic of Ireland.
- February 1999 - March 1999, Institut für Astronomie, Universität Wien, Vienna, Austria.
- April 1999 - May 1999, National Observatory of Athens, Institute of Ionospheric & Space Research, Athens, Greece.

6 Scholarships

- February 1996 - July 1996, from the ERASMUS Program
- November 1997 - August 2000, Ph.D. scholarship awarded from the "State Scholarship Foundation" (I.K.Y.) after nationwide examinations

7 Awards

- First Prize in the exams of the *8th Summer School on Complexity and Chaotic Dynamics of Nonlinear Systems*, July 1995, Xanthi, Greece (Chairman of the SOC: Prof. T. Bountis)

8 Participation in Research Programs

- *"Order and Chaos in conservative Dynamical Systems and applications in Astronomy, Celestial Mechanics and Atomic Physics"*, Greek General Secretariat of Research and Technology, (P.I. Prof. H. Varvoglis), 1997-1998.

- *"Trojanerbahnen"*, Jubiläumsfonds projektnummer 6446, Östereichische Nationalbank, P.I. Prof. R. Dvorak, 1999.

9 Computing Experience

I have used the following computer types and Operating Systems:
HP-9000/Series 700 (Unix) (in the Astronomy Lab) as well as Micros on DOS and LINUX. I am experienced in the use of the programing languages FORTRAN-77 and PASCAL, particularly in what concerns applications of Numerical Analysis and Simulations. I have worked on many different graphic enviroments, such as Windows 3.1/95/98/NT, X-Windows or TCP-IP network enviroment. During my research activities I have also used several software packages such as,

- Graphics: *Grapher, Xgraph, Gnuplot for Windows/X-Windows, Origin 5.0, SAO Image*
- Calculus: *Mathematica, Maple V, MatLab*
- Word Processors: Word for Windows 6.0/7.0, LaTeX
- Network Tools: Internet Explorer, Netscape Communicator, WS-FTP

Recently, I began working on parallel programming for non-uniform PC-cluster platforms on LINUX using Fortran 77/90 combined with the Message Passing Interface (MPI) library. The aim of this work is to enable me to conduct large-scale numerical simulations with respect to Solar System Dynamics.

10 Seminars - Conferences

10.1 Presentations in Seminars / Lectures

- *"Plasma Diffusion and Resistivity"*, December 1994, A.U.Th., oral presentation for the Plasma Physics course.
- *"Magnetospheric Dynamics"*, March 1995, A.U.Th., oral presentation for the Plasma Physics course.
- *"Numerical Simulations of YSO Jets"*, September 1996, A.U.Th., Diploma Thesis presentation

- *"The Perturbed Pendulum as a model of Hamiltonian Chaos"*, March 1997, A.U.Th., seminar for the Plasma Astrophysics Group.

- *Transport in the phase space of Hamiltonian systems and its relation to the maximal LCN's*, April 1998, A.U.Th., *International Seminar on Curerent issues of Environmental and Planetary Concern.*

- *"Stable chaos in the asteroid belt and its relation to the stickiness effect"*, February 1999, Astronomical Institute, University of Vienna, Austria.

- *"Thersites: a 'jumping' Trojan ?"*, March 1999, Astronomical Institute, University of Vienna, Austria.

- *"Diffusion channels and exit times from an extended sticky region of the standard map"*, March 1999, Astronomical Institute, University of Vienna, Austria.

- *"Stable chaos & stickiness in the asteroid belt"*, April 1999, A.U.Th., graduate seminar in the Astronomy Lab.

10.2 Participation in Conferences and Advanced Schools

1. "2nd Hellenic Astronomical Conference", July 1995, Peraia, Thessaloniki, Greece.

2. "8th Summer School/3rd Hellenic Conference on Complexity and Chaotic Dynamics of Non-Linear Systems", July 17-28 1995, Xanthi, Greece.

3. "Annual Meeting of the Irish Astronomical Society", April 1996, Dublin, Ireland.

4. "JENAM - 97", July 2-5 1997, Kallithea, Halkidiki, Greece (oral presentation).

5. "10th Summer School/5th Hellenic Conference on Complexity and Chaotic Dynamics of Non-Linear Systems", July 14-25 1997, Peraia, Thessaloniki, Greece (oral presentation).

6. "International Winter School on Nonlinear Time Series Analysis", February 11-21 1998, Max Planck Institute for Physics of Complex Systems, Dresden, Germany (poster presentation).

7. "An international seminar on current issues of Environmental and Planetary concern", April 1998, Aristotle University of Thessaloniki, Greece (oral presentation).

8. "IAU Colloquium No 172 - The Impact of Modern Dynamics in Astronomy", July 6-11 1998, FUNDP, Namur, Belgium (poster presentation).

9. "11th Summer School/6th Hellenic Conference on Complexity and Chaotic Dynamics of Non-linear Systems", July 13-25 1998, Levadia, Greece (poster presentation).

10.3 Conference and School Organization

I was a member of the LOC in

1. "2nd Hellenic Astronomical Conference", July 1995, Peraia, Thessaloniki, Greece.

2. "JENAM 97 - New trends in Astronomy & Astrophysics", July 2-5 1997, Kallithea, Halkidiki, Greece.

11 List of Publications

11.1 Publications in refereed journals

1. "On the relation between maximal LCN's and the Width of the Stochastic layer in a driven Pendulum", **K. Tsiganis**, A. Anastasiadis and H. Varvoglis, (1999), *J. Phys.* **A**: *Math. & Gen.*, **32**, 431-442.

2. "Dimensionality differences between sticky and non-sticky chaotic trajectory segments in a 3-D Hamiltonian system", **K. Tsiganis**, A. Anastasiadis and H. Varvoglis, (1999) *Chaos, Solitons & Fractals* in press.

3. "Stable chaos in the 12:7 mean motion resonance and its relation to the stickiness effect", **K. Tsiganis**, H. Varvoglis and J.D. Hadjidemetriou, (1999), submitted to *Icarus*.

4. "Thersites: a 'jumping Trojan ?", **K. Tsiganis**, R. Dvorak and E. Pilat-Lohinger, (1999), submitted to Astron. Astroph.

5. “Transport in the outer asteroid belt: Fokker-Planck approach vs. numerical integrations”, **K. Tsiganis**, A. Anastasiadis and H. Varvoglis, (1999), in preparation.

11.2 Proceeding of International Conferences (refereed)

1. “Effective Lyapunov Numbers and Correlation Dimensions in a 3-D Hamiltonian system”, **K. Tsiganis**, A. Anastasiadis and H. Varvoglis, in *IAU-Colloquium No 172: The Impact of Modern Dynamics in Astronomy*, J. Henrard and S. Ferraz-Mello (eds), 1999, in press.