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March 29, 1993

Professor Giovanni Crosta
Dipartimento di Scienze
dell'Informazione
Università degli Studi
Via Comelico, 39
20135 Milano
ITALY

Dear Professor Crosta,

The Dynamic Systems Project at IIASA is planning a workshop on *Modeling of Environmental Dynamics* which is to be held in Sopron, Hungary from August 30th to September 2nd, 1993. The arrival day is Sunday 29/08.

The main topics of the workshop will be:

1. Population dynamics

- qualitative behaviour of population models
- water quality modeling
- management of renewable resources

Biblioteca

2. Inverse problems in atmospheric and water pollution; environmental monitoring

- parameter estimation and identification
- observability
- control of uncertain distributed systems

Zuadrelli

Crosta

Presentation of Decision Support Systems and applications will also be welcomed. It is our pleasure to invite you to participate in the workshop. IIASA will provide all meals and accommodation in Hungary for the duration of the workshop. We are unfortunately unable to cover travel expenses.

Please return the attached preliminary registration form to Pascale Lambert at the above address or (e-mail: lambert@iiasa.ac.at) before May 15th, 1993. Thereafter, additional information will be sent to you. We look forward to having you with us.

Sincerely,

*Identification of Conductivity in Flow Equations
Recent Methods & Results*

Agenda

Tuesday 31 August, 1993

CHAIRMAN: Y: SVIREZHEV

- 09:00-09:30 : F. KAPPEL: Size-Structured Population Models with size Dispersion
- 09:30-10:00 : A. KRYAZHIMSKII: On Stable Real-Time Observers for Dynamic Systems
- 10:00-10:30 : G. CROSTA: Identification of Conductivity in Flow Equations: Recent Methods and Results
- 10:30-11:00 **Coffee Break**
- 11:00-11:30 : R. FERRIERE: Invasibility of Attractors in Ecological and Evolutionary Problems
- 11:30-12:00 : M: GATTO: Modeling and Managing Structured Populations Chamois in the Italian Alps and Eels in Comacchio Lagoon

12:30 **Lunch**

CHAIRMAN: F. KAPPEL

- NO 14:30-15:00 : J.P. AUBIN: Evolution of Coalitions Governed by Mutational Equations
- NO 15:00-15:30 : H. FRANKOWSKA: Lyapunov Second Method for Differential Inclusions with Measurable Time Dependence
- 15:30-16:00 : W. RUNDELL: Determining the Death Rate for an Age-Structured Population
- 16:00-16:30 **Coffee Break**
- 16:30-17:00 : M. KRUPA: Codimension 2 Bifurcations from Homoclinic Orbits
- ⊖ 17:00-17:30 : L. ZELIKINA: A Model of Optimal Dynamics of Renewable Resources

1993, Aug 31 10 am

MODELLING OF ENVIRONMENTAL DYNAMICS
Identification of Conductivity in Flow Equations:
Recent Methods and Results

Giovanni Crosta

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Abstract

The identification the leading coefficient (conductivity) in a second order ordinary differential equation (ODE) or in an elliptic partial differential equation (PDE) is the prototype of a class of inverse problems, which are relevant to environmental modelling. Herewith only identification of position dependent conductivity from interior measurements of both potential and source term will be considered. The following will be dealt with. 1) Uniqueness conditions and stability estimates in the one dimensional (ODE) case. A unifying view will be provided over said properties, which are affected by the regularity of the Cauchy problem for the unknown conductivity. Moreover, a non local uniqueness condition will be presented, which admits straightforward physical interpretation. 2) Stability estimates for the composite identification - and - control map, which relates measured potential, source term data to the potential computed from another source term and the conductivity identified from the former data pair. 3) The connection between dynamical systems and iterative algorithms, which identify anisotropic conductivity in two spatial dimensions by minimizing the equation error cost function. Some properties of the related gradient flows will be outlined as well as some numerical results.