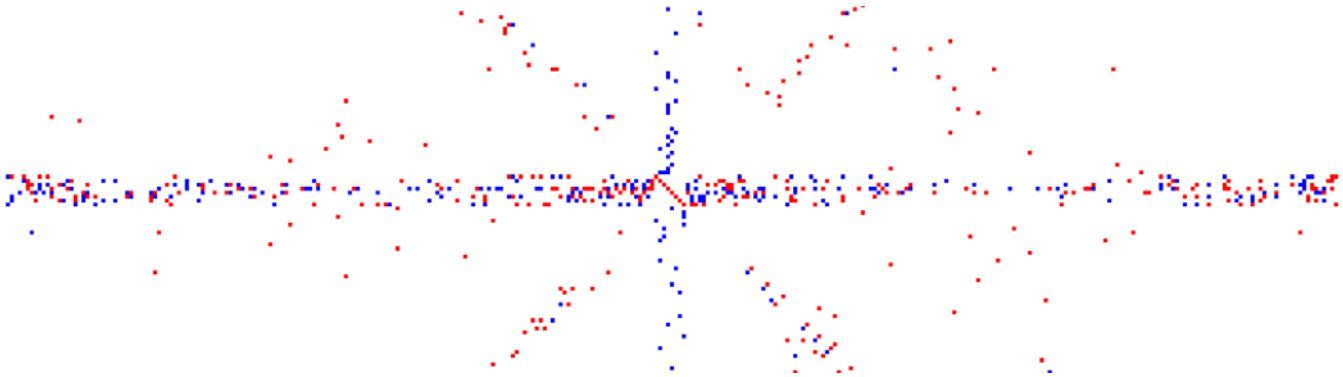
Helsinki University of Technology Control Engineering Laboratory

Espoo 2002 Report 133

ON THE UNIVERSALITY AND UNDECIDABILITY IN DYNAMIC SYSTEMS

Heikki Hyötyniemi



TEKNILLINEN KORKEAKOULU
TEKNISKA HÖGSKOLAN
HELSINKI UNIVERSITY OF TECHNOLOGY
TECHNISCHE UNIVERSITÄT HELSINKI
UNIVERSITE DE TECHNOLOGIE D´HELSINKI

Helsinki University of Technology Control Engineering Laboratory

Espoo December 2002 Report 133

ON THE UNIVERSALITY AND UNDECIDABILITY IN DYNAMIC SYSTEMS

Heikki Hyötyniemi

Abstract: This report studies a specific nonlinear system structure and shows that for this class of systems the theoretical undecidability issues become acute: It is possible to construct fixed systems within this class that defy all analysis attempts. Tools are introduced to utilize this framework, so that systems with special properties can be determined using a high-level description formalism.

Keywords: Computability, undecidability, dynamic systems, stability

Helsinki University of Technology
Department of Automation and Systems Technology
Control Engineering Laboratory

Distribution:
Helsinki University of Technology
Control Engineering Laboratory
P.O. Box 5400
FIN-02015 HUT, Finland
Tel. +358-9-451 5201
Fax. +358-9-451 5208
E-mail: control.engineering@hut.fi
http://www.control.hut.fi/

ISBN 951-22-6277-0
ISSN 0356-0872

Picaset Oy
Helsinki 2002

HELSINKI UNIVERSITY OF TECHNOLOGY CONTROL ENGINEERING LABORATORY

Editor: H. Koivo

Report 121 Cavazzutti, M.
Fuzzy Gain Scheduling of Multivariable Processes. September 2000.

Report 122 Uykan, Z.
Intelligent Control of DC/DC Switching Buck Converter. December 2000.

Report 123 Jäntti, R.
Power Control and Transmission Rate Management in Cellular Radio Systems - A snapshot analysis approach. May 2001.

Report 124 Uykan, Z.
Clustering-Based Algorithms For Radial Basis Function and Sigmoid Perceptron Networks. June 2001.

Report 125 Hyötyniemi, H.
Multivariate Regression - Techniques and tools. July 2001.

Report 126 Kaartinen, J.
Data Acquisition and Analysis System for Mineral Flotation. October 2001.

Report 127 Ylén, J.-P.
Measuring, Modelling and Controlling the pH value and the Dynamic Chemical State. November 2001.

Report 128 Gadoura, I. A., Suntio, T.
Implementation of Optimal Output Characteristic for a Telecom Power Supply - Fuzzy-logic approach. April 2002.

Report 129 Elmusrati, M. S.
Power Control and MIMO Beamforming in CDMA Mobile Communication Systems. August 2002.

Report 130 Pöyhönen, S., Negrea, M., Arkkio, A., Hyötyniemi, H.
Comparison of Reconstruction Schemes of Multiple SVM's Applied to Fault Classification of a Cage Induction Motor. August 2002.

Report 131 Pöyhönen, S.
Support Vector Machines in Fault Diagnostics of Electrical Motors. September 2002.

Report 132 Gadoura, I. A.
Design of Robust Controllers for Telecom Power Supplies. September 2002.

Report 133 Hyötyniemi, H.
On the Universality and Undecidability in Dynamic Systems. December 2002.

ISBN 951-22-6277-0

ISSN 0356-0872

Picaset Oy, Helsinki 2002