THE UNIVERSITY OF AUCKLAND
FACULTY OF ENGINEERING

MCDM

19th International Conference on Multiple Criteria Decision Making

MCDM for Sustainable Energy and Transportation Systems

7th – 12th January 2008

The University of Auckland, Auckland, New Zealand

Programme and Abstract Book

Contents

Message from the Chair of the Organising Committee

Dear colleagues

On behalf of the organising committee I welcome you to the 19th International Conference on Multiple Criteria Decision Making in Auckland, New Zealand. In 1975 the first meeting was organised by Herve Thieriez and Stanley Zionts in Jouy-en-Josas, France. In an approximately two-year cycle the conference has toured the world, usually alternating between Europe and overseas. I am especially proud that Auckland has been chosen as only the second location in the southern hemisphere, after the excellent conference organised by Theo Stewart in Cape Town in 1997.

The theme of the 19th meeting is "MCDM for Sustainable Energy and Transportation Systems". In the globalised economy of the 21st century the world has entered an age of exponentially increasing demand for energy and transportation services. Climate change and other environmental impacts of human economic activity necessitate the consideration of conflicting goals in decision making processes to develop sustainable systems. Multiple criteria decision making has a lot to offer in addressing this need.

The conference programme reflects that theme with many talks relating to applications of MCDM in sustainable development, transportation and energy systems, management of natural resources etc. However, you will also find papers on MCDM theory and methodology, applications in many other areas and interdisciplinary topics. I hope that you will all find the scientific programme stimulating and wish you fruitful discussions throughout the week.

The scientific programme is organised in 47 sessions, including two invited plenary talks by Prof. Anna Nagurney and Prof. Jim Petrie, the MCDM award plenary talks (the winners of the MCDM Gold Medal, Edgeworth-Pareto Award and the Georg Cantor award will be announced at the conference dinner), an opening session and the MCDM Society business meeting, to which all participants are invited. The contributed papers are organised in 42 parallel sessions (with only 3 talks in parallel to enable you to attend as many talks as possible).

You will also enjoy the social programme with a Powhiri and visit to Auckland Museum including a Maori performance that will let you experience the culture of the indigenous people of Aotearoa New Zealand. A ferry ride will take us across Waitemata harbour to Waiheke Island for the conference dinner at a winery on a hilltop offering marvellous views to the city.

I wish you all a pleasant and rewarding stay at Auckland.

Matthias Ehrgott

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Multiple Criteria Decision Support for Heating Systems in City Electro Transportation

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ABSTRACT

In this paper provision of optimal level of climate parameters in passengers' interior of public electro transportation by providing minimal electro energy consumption is looked over as the task of control optimization of mechatronic system. This task can be realized using artificial intellect and progressive multiple criteria decision making methods.

Popular Nelder-Mead multiple criteria decision making method will be applied in the article which gives a possibility to search for minimal value of some target function. In this case it is minimal electro energy consumption dependence on maximal comfort level.

The modeling and investigation are based on the typical architecture of heating ventilation and air condition system with a traditional application of AC induction motors for driving both compressor and fan of the conditioner. The well-known field-oriented method has been considered for the modeling.

A special interest for investigations and further development is devoted to intelligent heating systems allowing more flexible regulation of the system's compressor and fan operation, and, therefore, improvement of efficiency and energy saving. It is very important to gather information about all environmental and heating system variable parameters and their mutual interaction in the result of which it is possible to create a control system model and to make prognosis on its work.

Heat energy educed during moving process of electro transportation - power engine, brake resistors, control system, which usually is uselessly discharged into nature, takes an important place when saving electro energy. It is possible to collect this energy and to shift for heating needs of passengers' interior; wherewith electro energy consumption of heating system is reduced. When performing this kind of heat energy connection to heating systems, intellectual process control which is able to track fluctuations of heat energy and to make fast balancing of them from different sources has an important role. At the end of the article several conclusions are given.

Keywords: multiple criteria decision making, fuzzy logic, heating system, climate control, energy saving

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