

Biography of Keith W. Hipel



Keith W. Hipel is *University Professor* of Systems Design Engineering at the University of Waterloo where he is *Coordinator* of the Conflict Analysis Group. He is *Past President* of the Academy of Science within the Royal Society of Canada, *Senior Fellow* of the Centre for International Governance Innovation, *Fellow* of the Balsillie School of International Affairs, and *Past-Chair* of the Board of Governors of Renison University College. Dr. Hipel thoroughly enjoys mentoring students and is a recipient of the *Distinguished Teacher Award*, *Faculty of Engineering Teaching Excellence Award*, and the *Award of Excellence in Graduate Supervision* from the University of Waterloo, as well as the *2011 Outstanding Engineering Educator Award* from IEEE Canada. His major research interests are the development of conflict resolution, multiple criteria decision analysis, time series analysis and other decision-making methodologies for addressing complex

interdisciplinary system of systems engineering problems lying at the confluence of society, technology and the environment, with applications in water resources management, hydrology, environmental engineering, energy, and sustainable development. Prof. Hipel is the author or co-author of 4 books, 12 edited books, more than 295 journal papers, as well as many conference and encyclopedia articles (over 10,700 citations; H-index = 49, i10-index = 210). Dr. Hipel is the recipient of the *Japan Society for the Promotion of Science (JSPS) Eminent Scientist Award*; *Joseph G. Wohl Outstanding Career Award* from the IEEE Systems, Man and Cybernetics (SMC) Society; *IEEE SMC Norbert Wiener Award*; *Docteur Honoris Causa* (France); *Doctor Honoris Causa* (Hungary); *Sir John William Dawson Medal* (Royal Society of Canada); *Engineering Medal for Research and Development* from Professional Engineers Ontario; and *Foreign Member* designation of the United States National A

Grey Graph Model for Conflict Resolution

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Abstract

Grey number constructs are incorporated into the Graph Model for Conflict Resolution (GMCR) to reflect uncertainty in preferences when using the GMCR methodology to model and analyze strategic conflicts. Because a grey number constitutes a real number that may be a member of a discrete set of real numbers or reside within one or more intervals, it constitutes a flexible approach requiring little information for realistically representing uncertain preference for a decision maker (DM) involved in a conflict. The grey-based preference framework for each DM is embedded within the definitions of various solution concepts describing possible interactions that could take place among DMs as they behave according to their own self-interests as dictated by their underlying value systems. The grey-founded solution concepts, which are defined for explaining a rich range of human behavior under conflict, are Nash, general metarational, symmetric metarational, and sequential stability. The resulting grey GMCR methodology is applied to a generic sustainable development conflict and a brownfield redevelopment dispute with uncertain preferences in order to demonstrate how it can be conveniently utilized in practice to provide valuable strategic insights into situations involving high uncertainty.

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Kuang, H., Bashar, M.A., Hipel, K.W., and Kilgour, D.M., "Grey-based Preference in a Graph Model for Conflict Resolution with Multiple Decision Makers", IEEE Transactions on Systems, Man and

Cybernetics: Systems”, DOI: 10.1109/TSMC.2014.2387096, Vol. 45, No. 9, pp. 1254-1267, September 2015.

Kuang, H., Bashar, M.A., Kilgour, D.M., and Hipel, K.W., “Strategic Analysis of a Brownfield Revitalization Conflict Using the Grey-based Graph Model for Conflict Resolution”, EURO Journal on Decision Processes, DOI: 10.1007/s40070-015-0042-4, published online on May 28, 2015, Vol. 3, No. 3, pp. 219-248, November 2015.

Hanbin Kuang, Keith W. Hipel, D. Marc Kilgour, M. Abul Bashar. “A Case Study of Grey-based Preference in a Graph Model for Conflict Resolution with Two Decision Makers”, Proceedings of the 2013 IEEE International Conference on Systems, Man, and Cybernetics, pp. 2037-2041, held in Manchester, UK, 13-16 October 2013.

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