

**Developments in Fuzzy Sets,
Intuitionistic Fuzzy Sets,
Generalized Nets and Related Topics.
Volume I: Foundations**

**Recent Advances in Fuzzy Sets,
Intuitionistic Fuzzy Sets,
Generalized Nets and Related Topics
Volume I: Foundations**

Editors

Editors
Krassimir T. Atanassov
Michał Baczyński
Józef Drewniak
Krassimir T. Atanassov
Janusz Kacprzyk
Michał Baczyński
Maciej Krawczyk
Józef Drewniak
Janusz Kacprzyk
Maciej Krawczyk
Eulalia Szmidt
Maciej Wygralak
Sławomir Zadrozny

SRI PAS



IBS PAN

**Recent Advances in Fuzzy Sets,
Intuitionistic Fuzzy Sets,
Generalized Nets and Related Topics
Volume I: Foundations**



**Systems Research Institute
Polish Academy of Sciences**

**Recent Advances in Fuzzy Sets,
Intuitionistic Fuzzy Sets,
Generalized Nets and Related Topics
Volume I: Foundations**

Editors

Krassimir T. Atanassov

Michał Baczyński

Józef Drewniak

Janusz Kacprzyk

Maciej Krawczak

Eulalia Szmidt

Maciej Wygralak

Sławomir Zadrozny

IBS PAN



SRI PAS

© **Copyright by Systems Research Institute**
Polish Academy of Sciences
Warsaw 2011

All rights reserved. No part of this publication may be reproduced, stored in retrieval system or transmitted in any form, or by any means, electronic, mechanical, photocopying, recording or otherwise, without permission in writing from publisher.

Systems Research Institute
Polish Academy of Sciences
Newelska 6, 01-447 Warsaw, Poland
www.ibspan.waw.pl
ISBN 9788389475350

Contents

<i>Foreword</i>	V
<i>The intuitionistic fuzzy sets as constructive objects</i>	1
K.T. Atanassov	
<i>Intuitionistic fuzzy interpretations of Conway's game of Life. Part 3: Modal and extended modal transformations of the game field</i>	25
L. Atanassova and K. Atanassov	
<i>On the distributive equation $\mathcal{I}(x, \mathcal{S}_1(y, z)) = \mathcal{S}_2(\mathcal{I}(x, y), \mathcal{I}(x, z))$ for t-representable t-conorms generated from nilpotent or strict t-conorms</i>	33
M. Baczyński	
<i>Approximations of intuitionistic fuzzy numbers generated from approximations of fuzzy number</i>	43
A.I. Ban and L.C. Coroianu	
<i>Optimized algorithm for tokens transfer in generalized nets</i>	63
D.D. Dimitrov	
<i>Families of fuzzy preferences</i>	69
J. Drewniak	
<i>Problem of monotonicity for decomposable operations</i>	79
P. Drygaś	
<i>The inclusion-exclusion principle in semigroups</i>	87
J. Kelemenova	
<i>Fuzzy implications on lattice of ordered fuzzy numbers</i>	95
W. Kosiński and M. Kacprzak	
<i>Dependencies between fuzzy negation, disjunction and implication</i>	113
A. Król	

<i>The inclusion-exclusion principle on some algebraic structures</i>	123
M. Kuková	
<i>On max- * fuzzy systems</i>	127
Z. Matusiewicz	
<i>Properties of intuitionistic fuzzy preference relations</i>	143
A. Pękala and U. Dudziak	
<i>Uncertainty of probability</i>	159
A. Piegat	
<i>Conditional distributivity of increasing binary operations</i>	175
E. Rak	
<i>Central limit theorem on IV-events</i>	187
K. Samuelcik and I. Holla	
<i>Local entropy on IF-events</i>	197
K. Samuelcik and I. Holla	
<i>Aggregation of *-transitive fuzzy relations by quasi - linear means</i>	209
J. Sobera	
<i>Pearson's correlation coefficient between intuitionistic fuzzy sets: an extended theoretical and numerical analysis</i>	223
E. Szmidt, J. Kacprzyk and P. Bujnowski	
<i>Scalar and fuzzy cardinalities – tools for intelligent counting under information imprecision</i>	237
M. Wygralak	

The papers presented in this Volume 1 constitute a collection of contributions, both of a foundational and applied type, by both well-known experts and young researchers in various fields of broadly perceived intelligent systems.

It may be viewed as a result of fruitful discussions held during the Ninth International Workshop on Intuitionistic Fuzzy Sets and Generalized Nets (IWIFSGN-2010) organized in Warsaw on October 8, 2010 by the Systems Research Institute, Polish Academy of Sciences, in Warsaw, Poland, Institute of Biophysics and Biomedical Engineering, Bulgarian Academy of Sciences in Sofia, Bulgaria, and WIT - Warsaw School of Information Technology in Warsaw, Poland, and co-organized by: the Matej Bel University, Banska Bystrica, Slovakia, Universidad Publica de Navarra, Pamplona, Spain, Universidade de Tras-Os-Montes e Alto Douro, Vila Real, Portugal, and the University of Westminster, Harrow, UK:

<http://www.ibspan.waw.pl/ifs2010>

The consecutive International Workshops on Intuitionistic Fuzzy Sets and Generalized Nets (IWIFSGNs) have been meant to provide a forum for the presentation of new results and for scientific discussion on new developments in foundations and applications of intuitionistic fuzzy sets and generalized nets pioneered by Professor Krassimir T. Atanassov. Other topics related to broadly perceived representation and processing of uncertain and imprecise information and intelligent systems have also been included. The Ninth International Workshop on Intuitionistic Fuzzy Sets and Generalized Nets (IWIFSGN-2010) is a continuation of this undertaking, and provides many new ideas and results in the areas concerned.

We hope that a collection of main contributions presented at the Workshop, completed with many papers by leading experts who have not been able to participate, will provide a source of much needed information on recent trends in the topics considered.

ISBN-13 9788389475350
ISBN 838947535-9



9 788389 475350