



I T H E A

International Journal
MODELS
INFORMATION **&**
ANALYSES

2016 **Volume 5** **Number 3**

**International Journal
INFORMATION MODELS & ANALYSES
Volume 5 / 2016, Number 3**

EDITORIAL BOARD

Editor in chief: **Krassimir Markov** (Bulgaria)

Alberto Arteta	(Spain)	Levon Aslanyan	(Armenia)
Albert Voronin	(Ukraine)	Luis Fernando de Mingo	(Spain)
Aleksey Voloshin	(Ukraine)	Liudmila Cheremisinova	(Belarus)
Alexander Palagin	(Ukraine)	Lyudmila Lyadova	(Russia)
Alexey Petrovskiy	(Russia)	Martin P. Mintchev	(Canada)
Alfredo Milani	(Italy)	Nataliia Kussul	(Ukraine)
Anatoliy Krissilov	(Ukraine)	Natalia Ivanova	(Russia)
Avram Eskenazi	(Bulgaria)	Natalia Pankratova	(Ukraine)
Boris Tsankov	(Bulgaria)	Nelly Maneva	(Bulgaria)
Boris Sokolov	(Russia)	Olga Nevzorova	(Russia)
Diana Bogdanova	(Russia)	Orly Yadid-Pecht	(Israel)
Ekaterina Solovyova	(Ukraine)	Pedro Marijuan	(Spain)
Elena Chebanyuk	(Ukraine)	Rafael Yusupov	(Russia)
Evgeniy Bodyansky	(Ukraine)	Sergey Kryvyy	(Ukraine)
Galyna Gayvoronska	(Ukraine)	Stoyan Poryazov	(Bulgaria)
Galina Setlac	(Poland)	Tatyana Gavrilova	(Russia)
George Totkov	(Bulgaria)	Tea Munjishvili	(Georgia)
Gurgen Khachatryan	(Armenia)	Valeria Gribova	(Russia)
Hasmik Sahakyan	(Armenia)	Vasil Sgurev	(Bulgaria)
Iliia Mitov	(Bulgaria)	Vitalii Velychko	(Ukraine)
Juan Castellanos	(Spain)	Vladimir Donchenko	(Ukraine)
Koen Vanhoof	(Belgium)	Vladimir Ryazanov	(Russia)
Krassimira B. Ivanova	(Bulgaria)	Yordan Tabov	(Bulgaria)
Leonid Hulianytskyi	(Ukraine)	Yuriy Zaichenko	(Ukraine)

**IJ IMA is official publisher of the scientific papers of the members of
the ITHEA® International Scientific Society**

IJ IMA rules for preparing the manuscripts are compulsory.

The rules for the papers for ITHEA International Journals are given on www.ithea.org.

The camera-ready copy of the paper should be received by ITHEA® Submission system <http://ij.ithea.org>.

Responsibility for papers published in IJ IMA belongs to authors.

International Journal "INFORMATION MODELS AND ANALYSES" Volume 5, Number 3, 2016

Edited by the **Institute of Information Theories and Applications FOI ITHEA**, Bulgaria, in collaboration with
Institute of Mathematics and Informatics, BAS, Bulgaria,
V.M.Glushkov Institute of Cybernetics of NAS, Ukraine,
Universidad Politecnica de Madrid, Spain,
Hasselt University, Belgium,
Institute of Informatics Problems of the RAS, Russia,
St. Petersburg Institute of Informatics, RAS, Russia
Institute for Informatics and Automation Problems, NAS of the Republic of Armenia,

Publisher: **ITHEA®** Sofia, 1000, P.O.B. 775, Bulgaria. www.ithea.org, e-mail: info@foibg.com

Technical editor: **Ina Markova**

Printed in Bulgaria

Copyright © 2016 All rights reserved for the publisher and all authors.

© 2012-2016 "Information Models and Analyses" is a trademark of ITHEA®

® ITHEA is a registered trade mark of FOI-Commerce Co.

ISSN 1314-6416 (printed)

ISSN 1314-6432 (Online)