# The Fifteenth International Conference on Fuzzy Set Theory and Applications



# FSTA 2020

Liptovský Ján, Slovak Republic

January 26-31, 2020

# Programme



UNIVERSITY OF OSTRAVA
INSTITUTE FOR RESEARCH
AND APPLICATIONS
OF FUZZY MODELING



SLOVENSKÁ TECHNICKÁ
UNIVERZITA V BRATISLAVE

# Organized by

Institute for Research and Applications of Fuzzy Modeling,
University of Ostrava

Department of Mathematics and Descriptive Geometry,
Faculty of Civil Engineering,
Slovak University of Technology in Bratislava

# in co-operation with

# SIPKES s.r.o. and

# and sponsored by

## MDPI and

# Conference venue

## About the Liptov region

Liptov is a historical and geographical region in central Slovakia with historical and cultural centres in cities Liptovský Mikuláš, Ružomberok, and Liptovský Hrádok. The whole region is surrounded by the highest mountains in Slovakia, including High Tatras, West Tatras, Low Tatras, or Great Fatra. Tourists may enjoy the richness of nature provided by two national parks, namely the Tatra National Park and the Low Tatra National Park. The beautiful nature offers a lot, mountains, caves, animals, or plants; tourists usually appreciate splendid ski resort Jasná (closely located to the conference venue) and hot springs spas (e.g. Tatralandia in Liptovský Mikuláš or Bešňová)

## Venue

The venue of the conference – Alexandra Wellness Hotel – lies in the village Liptovský Ján, located 4km from the Exit 279 of the main Slovakian Highway D1 (E50).

## Bus connections

If you do not intend to come by car, the organizers will assist you in getting to the hotel and getting back from the hotel to the train station in Liptovský Mikuláš by organizing buses at the following scheduled departure times:

Sunday, January 26 (Liptovský Mikuláš train station – Alexandra Wellness Hotel) departures:

**14:00, 15:00, 16:20, 18:20, 20:20, 21:20**

Friday, January 31 (Alexandra Wellness Hotel – Liptovský Mikuláš train station) departures:

**9:15, 11:15, 12:30, 13:30**

Apart from the free buses by the organizers, participants may use the standard buses operating every day. **Their schedule in PDF is linked on the conference web.**

## Hotel services

Alexandra Wellness Hotel as the conference hotel does not provide only accommodation, catering, and conference rooms' services. It is here to make you feeling like in a paradise. It offers the following services:

- unlimited access to the swimming pool, one free access to the wellness centre per day,
- free wifi, free access to fitness centre, free table tennis,
- bowling tracks for rent (20% discount for hotel guests)
- rent of an indoor sport hall.

**Enjoy your stay as much as you can.**

# General Information

## Registration

The registration desk will be open in the conference hotel during the following hours:

- Sunday, January 26, 16:00 – 19:30,
- Monday, January 27, 8:30 – 9:00 and 10:10 – 10:40.

If your arrival does not allow to approach the registration desk in the hours given above, feel free to approach organizer, your registration will be done upon your request individually.

## Lectures

Each lecture room will be equipped with a computer with Acrobat Reader and Powerpoint, a data projector, a canvas, and a laser-pointer. Each lecture has a determined time slot for 20 minutes including the discussion. We kindly ask the speakers to:

- come to the lecture room in time in order to upload the slides to the provided computer before the beginning of the session and to avoid slowing down the schedule of the session;
- to leave some time for the discussion (if the talk will not be finished in time, the chairman cannot allow the discussion);
- to avoid risking problems with Powerpoint presentations and to consider converting then to PDF.

**The only official language of the conference is English.**

## Catering

Participants will be provided with the full board catering, namely with dinners starting from Sunday, January 26 and ending with the gala dinner on Thursday, January 30, and with lunches starting from Monday, January 27 and ending with the lunch on Friday, January 31. Accommodation automatically includes breakfasts buffet. The lectures will be separated by appropriately scheduled coffee breaks with some drinks and small refreshments.

## Health

The emergency phone number call ambulance is the standard European 112. The same number can be used for calling to police or a fire department. We hope that the participant will not have any reason to use them.

## Currency

Slovakia uses EUR currency. (Current exchange rate to USD is: 1.00 USD = 0.90 EUR.)

## Electricity

The standard electrical voltage in Slovakia is 230 volts AC, 50Hz. The electrical sockets are identical to the standard European sockets.

## Telephone

The international access code for Slovakia is +421. **Please silence your mobile phone during all conference sessions.**

## Weather

The weather in Slovakian mountains in January can differ a lot and the temperatures may range from low positive degrees Celsius to rare extremes below -30°C. In general, be ready for classical winter mountain weather and you will not get surprised.

## Time-zone

Slovakia uses the Central European Time (CET) that is the Greenwich Mean Time (GTM) plus 1 hour.

# Social events

## Excursions (13:15 – 17:30)

FSTA traditionally offers excursions to its participants. After several years when trips to sulfur springs spa dominated, the excursion trips were organized to Hotel Permon Spa (Sauna) Paradise and to Demänovská Cave of Liberty. As the main conference hotel is a wellness hotel offering rich wellness programme of a high quality, we decided to replace the first excursion goal (Hotel Permon) with a new one – Slovak Museum of Nature Protection and Speleology in Liptovský Mikuláš. Buses will be provided and entrance fees are included. The only thing we need is that each interested participant registers by singing in on particular sheets placed on the board at the conference site.

### Excursion no. 1 - Demänovská Cave of Liberty

### BUS departure 13:15

Demänovská Cave of Liberty is a karst cave in Low Tatras in Slovakia. It is the most visited cave in Slovakia. Of the total length of 8126 metres, 1800 metres are open to the public. The cave is richly decorated with many stalactites, stalagmites and stalagmites. It contains large domes with the largest one called the Great Dome with height of 41m, with length of 75m and width of 35m.



### Excursion no. 2 – Slovak Museum of Nature Protection and Speleology

### BUS departure 13:30

Slovak Museum of Nature Protection and Speleology has been opened after a long lasting extensive reconstruction that took four years. Now, it provides visitors with impressive interactive

exhibitions presenting Slovakian nature, geology, animals, mountains, caves and speleology. Come and see what previous FSTA participants never had a chance to see.



## Concert (Wednesday 19:30 – 20:30)

It is again a tradition specific for FSTA that Wednesday evening is reserved for the concert consisting of participants' performances. Something you cannot miss, something you have to see, something you have to listen.

## Football match (Thursday 16:30 – 17:30)

When we – organizers – decided for the change of the hotel, and contracted the Alexandra Wellness Hotel that offers rich sport background including an indoor sport hall, we found it suitable for an attempt to set up a new tradition: a football match between organizers and participants. We ask all participants to come to support both teams in building the tradition of friendly matches with joy, respect and fun. Cheerleaders are especially welcome.

## Gala dinner (Thursday 19:00)

Gala dinner is traditionally the main social event of any conference. The one at FSTA provides a lot, the award ceremony, rich food buffet, but mainly, fabulous local folklore "dulcimer" band performance that lasts hours and hours and provides an amazing opportunity for dancing.

# Programme At Glance

FSTA 2020 - Programme full of colours

| | |
|---|---|
| | If it is blue, it is AGOP-like session. T-norms and copulas, measures and integrals? This is your session. |
| | Green is simply special: "Mathematical Methods Towards Dealing with Uncertainty in Applied Sciences". |
| | Is algebra, logic, or morphology your hobby? Categorically, you have visit magenta sessions. |
| | Applications attract your interest? Ivory colour shows you the direction, follow it. |
| | Fuzzy sets and relations, similiarities and metrics, reasoning and modeling. Orange is your habitat. |
| | Data analysis and statistics, clustering and classification, learning and opitimization, lots of topics in appricot for you. |
| | Food and fun, either coffee or gala dinner, concert, football or excursion, white is for everyone. |

## SUNDAY, JANUARY 26

| 16:30 - 19:30 | Foyer | Registration |
|---|---|---|
| 19:30 - 21:00 | Restaurant | Dinner |

## MONDAY, JANUARY 27

| 8:30 - 9:00 | Foyer | Registration |
|---|---|---|
| 9:00 - 9:10 | Congress Hall | Opening Ceremony |
| 9:10 - 10:10 | Congress Hall | Invited Talk: De Baets Bernard |
| 10:10 - 10:40 | Foyer | Coffee Break |
| 10:40 - 12:00 | Room A | Session 1 |
| 10:40 - 11:40 | Room B | Session 2 |
| 12:15 - 13:30 | Restaurant | Lunch |
| 16:10 - 16:40 | Foyer | Coffee Break |
| 16:40 - 18:00 | Room A | Session 3 |
| 16:40 - 18:00 | Room B | Session 4 |
| 18:30 - 19:30 | Restaurant | Dinner |

## TUESDAY, JANUARY 28

| 9:10 - 10:10 | Congress Hall | Invited Talk: Uzay Kaymak |
|---|---|---|
| 10:10 - 10:40 | Foyer | Coffee Break |
| 10:40 - 12:00 | Room A | Session 5 |
| 10:40 - 12:00 | Room B | Session 6 |
| 12:15 - 13:30 | Restaurant | Lunch |
| 16:10 - 16:40 | Foyer | Coffee Break |
| 16:40 - 18:00 | Room A | Session 7 |
| 16:40 - 18:00 | Room B | Session 8 |
| 18:30 - 19:30 | Restaurant | Dinner |

## WEDNESDAY, JANUARY 29

| | | |
|---|---|---|
| 8:50 - 10:10 | Room A | Session 9 |
| 8:50 - 10:10 | Room B | Session 10 |
| 10:10 - 10:30 | Foyer | Coffee Break |
| 10:30 - 11:50 | Room A | Session 11 |
| 10:30 - 11:50 | Room B | Session 12 |
| 12:00 - 13:00 | Restaurant | Lunch |
| 13:15 - 16:15 | Cave | Excursion A |
| 13:30 - 17:30 | Museum | Excursion B |
| 18:15 - 19:15 | Restaurant | Dinner |
| 19:30 - 21:00 | | Concert |

## THURSDAY, JANUARY 30

| | | |
|---|---|---|
| 9:10 - 10:10 | Congress Hall | Invited Talk: Fernandez Javier |
| 10:10 - 10:40 | Foyer | Coffee Break |
| 10:40 - 12:00 | Room A | Session 13 |
| 10:40 - 12:00 | Room B | Session 14 |
| 12:15 - 13:30 | Restaurant | Lunch |
| 13:40 - 15:20 | Room A | Session 15 |
| 13:40 - 15:00 | Room B | Session 16 |
| 15:20 - 15:50 | Foyer | Coffee Break |
| 16:30 - 17:30 | Sport Hall | Football Match |
| 19:00 - 23:30 | | Gala Dinner |

## FRIDAY, JANUARY 31

| | | |
|---|---|---|
| 9:30 - 10:30 | Congress Hall | Invited Talk: Asmuss Svetlana |
| 10:30 - 11:00 | Foyer | Coffee Break |
| 11:00 - 12:00 | Congress Hall | Invited Talk: Grzegorzewski Przemysław |
| 12:00 - 12:15 | Congress Hall | Closing Ceremony |
| 12:15 - 13:30 | Restaurant | Lunch |

# Detailed Programme

## FSTA 2020 - Programme full of colours

| | |
|---|---|
| ⬜ (blue) | If it is blue, it is AGOP-like session. T-norms and copulas, measures and integrals? This is your session. |
| ⬜ (green) | Green is simply special: "Mathematical Methods Towards Dealing with Uncertainty in Applied Sciences". |
| ⬜ (magenta) | Is algebra, logic, or morphology your hobby? Categorically, you have visit magenta sessions. |
| ⬜ (ivory) | Applications attract your interest? Ivory colour shows you the direction, follow it. |
| ⬜ (orange) | Fuzzy sets and relations, similiarities and metrics, reasoning and modeling. Orange is your habitat. |
| ⬜ (apricot) | Data analysis and statistics, clustering and classification,  learning and opitimization, lots of topics in appricot for you. |
| ⬜ (white) | Food and fun, either coffee or gala dinner, concert, football or excursion, white is for everyone. |

### SUNDAY, JANUARY 26

| 16:30 - 19:30 | REGISTRATION |
|---|---|

| 19:30 - 21:00 | DINNER |
|---|---|

### MONDAY, JANUARY 27

| 8:30 - 9:00 | REGISTRATION |
|---|---|

| 9:00 - 9:10 | OPENING CEREMONY |
|---|---|

**INVITED TALK**

| 9:10 - 10:10 | *Speaker:* | De Baets Bernard |
|---|---|---|
| | *Title:* | *A paradigm shift in aggregation theory* |

| 10:10 - 10:40 | COFFEE BREAK |
|---|---|

| Time slot | Room A | Session 1 |
|---|---|---|
| 10:40 - 11:00 | *Authors:* | Boczek Michał, Hovana Anton, Hutník Ondrej, Kaluszka Marek |
| | *Title:* | *Upper and lower n-Sugeno integral as a generalization of h-index* |
| 11:00 - 11:20 | *Authors:* | Bustince Humberto, Mesiar Radko, Fernandez Javier, Paternain Daniel, Takáč Zdenko |
| | *Title:* | *Dissimilarity based Choquet integrals* |
| 11:20 - 11:40 | *Authors:* | Borzová Jana, Halčinová Lenka, Šupina Jaroslav |
| | *Title:* | *On a generalization of level measures* |
| 11:40 - 12:00 | *Authors:* | Horanská Ľubomíra, Bustince Humberto, Fernandez Javier, Mesiar Radko |
| | *Title:* | *On some generalizations of decomposition integrals* |

| Time slot | Room B | Session 2 |
|---|---|---|
| 10:40 - 11:00 | *Authors:* | Škorupová Nicole, Kupka Jiří |
| | *Title:* | *On PSO-based approximation of Zadeh's extension principle* |
| 11:00 - 11:20 | *Authors:* | Cánovas José S., Kupka Jiří |
| | *Title:* | *Topological entropies of (fuzzy) dynamical systems* |
| 11:20 - 11:40 | *Authors:* | Janeček Jiří, Perfilieva Irina |
| | *Title:* | *F-transform as a dimensionality reduction method: an overview* |

| 12:15 - 13:30 | LUNCH |
|---|---|

| 16:10 - 16:40 | COFFEE BREAK |
|---|---|

| Time slot | Room A | Session 3 |
|---|---|---|
| 16:40 - 17:00 | *Authors:* | Šeliga Adam |
| | *Title:* | *An overview of modifications of decomposition integrals* |
| 17:00 - 17:20 | *Authors:* | Šeliga Adam, Smrek Peter |
| | *Title:* | *Chebyshev and Jensen inequalities for collection integrals* |
| 17:20 - 17:40 | *Authors:* | Ontkovičová Zuzana |
| | *Title:* | *Choquet-like approach to non-additive entropy and f–divergence* |
| 17:40 - 18:00 | *Authors:* | Stupňanová Andrea |
| | *Title:* | *Symmetric bi-capacities based Choquet integrals* |

| Time slot | Room B | Session 4 |
|---|---|---|
| 16:40 - 17:00 | *Authors:* | Krídlo Ondrej, Ojeda-Aciego Manuel |
| | *Title:* | *Isotone L-fuzzy FCA and categories L-ChuCors and L-Rel* |
| 17:00 - 17:20 | *Authors:* | Papčo Martin, Frič Roman |
| | *Title:* | *Lifting and sagging observables* |
| 17:20 - 17:40 | *Authors:* | Močkoř Jiří |
| | *Title:* | *Powerset structures in categories with fuzzy relations* |
| 17:40 - 18:00 | *Authors:* | Uljane Ingrida, Šostak Alexander |
| | *Title:* | *On categories of many-level fuzzy morphological spaces* |

| 18:30 - 19:30 | DINNER |
|---|---|

## TUESDAY, JANUARY 28

| INVITED TALK | | |
|---|---|---|
| 9:10 - 10:10 | *Speaker:* | Kaymek Uzay |
| | *Title:* | *Separating the Wheat from the Chaff: on relevant science and the terror of theory* |

| 10:10 - 10:40 | COFFEE BREAK |
|---|---|

| Time slot | Room A | Session 5 |
|---|---|---|
| 10:40 - 11:00 | *Authors:* | Harding John, Heunen Chris, Lindenhovius Bert, Navara Mirko |
| | *Title:* | *New description of quantum structures* |
| 11:00 - 11:20 | *Authors:* | Kühr Jan, Paseka Jan |
| | *Title:* | *Every quantum B-algebra is a set of residuables in a partially ordered semigroup* |
| 11:20 - 11:40 | *Authors:* | Dyczkowski Krzysztof, Pękala Barbara |
| | *Title:* | *New methods to compare interval-valued fuzzy sets cardinalities with applications* |
| 11:40 - 12:00 | *Authors:* | Uhliarik Ivor |
| | *Title:* | *DPLL-based fuzzy SAT solver for product logic: The implementation* |

| Time slot | Room B | Session 6 |
|---|---|---|
| 10:40 - 11:00 | *Authors:* | Šostak Alexander, Grigorenko Olga |
| | *Title:* | *On a t-conorm based approach to fuzzy metrics* |
| 11:00 - 11:20 | *Authors:* | Grigorenko Olga, Šostak Alexander |
| | *Title:* | *Fuzzy metric based on fuzzy equivalence relation* |
| 11:20 - 11:40 | *Authors:* | Štěpnička Martin, Škorupová Nicole, Holčapek Michal |
| | *Title:* | *How to order extensional fuzzy numbers* |
| 11:40 - 12:00 | *Authors:* | Bentkowska Urszula, Pękala Barbara |
| | *Title:* | *The equivalence measure for interval-valued fuzzy setting* |

| 12:15 - 13:30 | LUNCH |
|---|---|

| 16:10 - 16:40 | COFFEE BREAK |
|---|---|

| Time slot | Room A | Session 7 |
|---|---|---|
| 16:40 - 17:00 | *Authors:* | Hudec Miroslav |
| | *Title:* | *Fuzzy classification by aggregation functions* |
| 17:00 - 17:20 | *Authors:* | Pukitis Martins |
| | *Title:* | *Fuzzy classification of satellite images: fusion of supervised and unsupervised methods* |
| 17:20 - 17:40 | *Authors:* | Krastiņš Māris |
| | *Title:* | *Application of aggregation operators under constraints of critical parameters* |
| 17:40 - 18:00 | *Authors:* | Lama Reinis, Asmuss Svetlana |
| | *Title:* | *Sensitivity analysis for optimization problems with fuzzy relation inequality constraints* |

| Time slot | Room B | Session 8 |
|---|---|---|
| 16:40 - 17:00 | *Authors:* | Neocleous Costas, Petkov Nicolai, Neocleous Andreas, Schizas Christos |
| | *Title:* | *The effects of concurrent major disasters on a currency rating. Modelling with a fuzzy cognitive map* |
| 17:00 - 17:20 | *Authors:* | Ballová Dominika |
| | *Title:* | *Statistical detection of changes in Hydrometeorology* |
| 17:20 - 17:40 | *Authors:* | Czebe András |
| | *Title:* | *Fuzzy logic behind forensic identity* |
| 17:40 - 18:00 | *Authors:* | Asharin Vlad, Shaposhnik Grigory, Fadeev Egor, Zubyuk Andrey |
| | *Title:* | *Return-based investment portfolio analysis using qualitative subjective information in the form of "soft" inequalities* |

| 18:30 - 19:30 | DINNER |
|---|---|

# WEDNESDAY, JANUARY 29

| Time slot | Room A | Session 9 |
|---|---|---|
| 8:50 - 9:10 | *Authors:* | Dombi József, Baczyński Michał |
| | *Title:* | *New type of fuzzy implications: the mean implications* |
| 9:10 - 9:30 | *Authors:* | Drygaś Paweł |
| | *Title:* | *Monotonicity in the generalization of ordinal sums of fuzzy implications* |
| 9:30 - 9:50 | *Authors:* | Hovana Anton, Boczek Michał |
| | *Title:* | *Beyond the class of comonotone functions* |
| 9:50 - 10:10 | *Authors:* | Sesma-Sara Mikel, Mesiar Radko, Bustince Humberto |
| | *Title:* | *Relaxed forms of monotonicity in different fuzzy settings* |

| Time slot | Room B | Session 10 |
|---|---|---|
| 8:50 - 9:10 | *Authors:* | Perfilieva Irina |
| | *Title:* | *F-transform of multivariate function based on non-separable partition* |
| 9:10 - 9:30 | *Authors:* | Orlovs Pavels, Asmuss Svetlana |
| | *Title:* | *F-transform of multivariate function based on non-separable partition* |
| 9:30 - 9:50 | *Authors:* | Zubyuk Andrey, Asharin Vlad |
| | *Title:* | *Using qualitative subjective information in the form of "soft" inequalities to solve some ill-posed inverse problems* |
| 9:50 - 10:10 | *Authors:* | Pham Thi Minh Tam, Perfilieva Irina |
| | *Title:* | *Regularization of the inverse problem for a time-fractional diffusion equation* |

| 10:10 - 10:30 | COFFEE BREAK |
|---|---|

| Time slot | Room A | Session 11 |
|---|---|---|
| 10:30 - 10:50 | *Authors:* | Bohdalová Mária, Nánásiová Oľga |
| | *Title:* | *Clustering and entropy* |
| 10:50 - 11:10 | *Authors:* | Bustince Humberto, Castillo Aitor, Rodrigues Iosu, Fumanal Javier, Fernandez Javier, Minárová Mária |
| | *Title:* | *Effect of different distances in the gravitational clustering algorithm* |
| 11:10 - 11:30 | *Authors:* | Bacigál Tomáš |
| | *Title:* | *Tools for application of 1-factor copula* |
| 11:30 - 11:50 | *Authors:* | Varshney Ayush K., Muhuri Pranab K., Lohani Q. M. Danish |
| | *Title:* | *Normalized density based intuitionistic fuzzy c-means clustering algorithm* |

| Time slot | Room B | Session 12 |
|---|---|---|
| 10:30 - 10:50 | *Authors:* | Murinová Petra, Novák Vilém |
| | *Title:* | *Extending a generalized square of the opposite to the generalized cube of the opposite* |
| 10:50 - 11:10 | *Authors:* | Boffa Stefania, Murinová Petra, Novák Vilém |
| | *Title:* | *New formal concepts with intermediate quantifiers* |
| 11:10 - 11:30 | *Authors:* | Novák Vilém |
| | *Title:* | *Rough sets vs. topology in the Alternative Set Theory* |
| 11:30 - 11:50 | *Authors:* | Dvořák Antonín, Holčapek Michal |
| | *Title:* | *On semantic properties of monadic fuzzy quantifiers defined over fuzzy universes* |

| 12:00 - 13:00 | LUNCH |
|---|---|

| 13:15 - 17:30 | EXCURSIONS |
|---|---|

| 18:15 - 19:15 | DINNER |
|---|---|

| 19:30 - 21:00 | CONCERT |
|---|---|

# THURSDAY, JANUARY 30

| INVITED TALK | |
|---|---|
| 9:10 - 10:10 | *Speaker:* Fernandez Javier |
| | *Title:* *Some new information fusion methods with an application in the computational brain* |

| 10:10 - 10:40 | COFFEE BREAK |
|---|---|

| Time slot | Room A | Session 13 |
|---|---|---|
| 10:40 - 11:00 | *Authors:* | Hliněná Dana, Kalina Martin |
| | *Title:* | *A note on an open problem of Alsina-Frank-Schweizer* |
| 11:00 - 11:20 | *Authors:* | Halaš Radomír, Mesiar Radko, Pócs Jozef |
| | *Title:* | *Representation of V-preserving and Λ-preserving aggregation functions via binary relations* |
| 11:20 - 11:40 | *Authors:* | Mesiar Radko, Kolesárová Anna |
| | *Title:* | *Outliers-based aggregation* |
| 11:40 - 12:00 | *Authors:* | Banerjee Debasmita, Guha Debashree, Mesiar Radko |
| | *Title:* | *On the concept of extended partitioned Bonferroni mean operator* |

| Time slot | Room B | Session 14 |
|---|---|---|
| 10:40 - 11:00 | *Authors:* | Yoon Jin Hee |
| | *Title:* | *Mediation and moderation analysis for fuzzy data* |
| 11:00 - 11:20 | *Authors:* | Ballová Dominika, Kalická Jana |
| | *Title:* | *Data analysis and data visualisation of models' reliability for punching resistance assessment* |
| 11:20 - 11:40 | *Authors:* | Uriz Mikel, Paternain Daniel, Bustince Humberto, Galar Mikel |
| | *Title:* | *A fuzzy measure learning algorithm for improving classifier ensembles* |
| 11:40 - 12:00 | *Authors:* | Uykur Nazli Ece, Mutlu Begum, Akcapinar Sezer Ebru |
| | *Title:* | *Assessment of fuzzy rule generation methods by considering portability* |

| 12:15 - 13:30 | LUNCH |
|---|---|

| Time slot | Room A | Session 15 |
|---|---|---|
| 13:40 - 14:00 | *Authors:* | Miś Katarzyna, Baczyński Michał |
| | *Title:* | *Application of fuzzy approximate reasoning for image customization* |
| 14:00 - 14:20 | *Authors:* | Huidobro Pedro, Alonso Pedro, Janiš Vladimír, Montes Susana |
| | *Title:* | *Convexity for hesitant fuzzy sets* |
| 14:20 - 14:40 | *Authors:* | Palangetić Marko, Cornelis Chris, Greco Salvatore, Słowiński Roman |
| | *Title:* | *On granularity of fuzzy rough set models* |
| 14:40 - 15:00 | *Authors:* | Tiwari Ashutosh, Lohani Q.M. Danish, Muhuri Pranab K. |
| | *Title:* | *Interval-valued intuitionistic fuzzy TOPSIS method for supplier selection problem* |
| 15:00 - 15:20 | *Authors:* | Shukla Amit K., Muhuri Pranab K., Lohani Q.M. Danish |
| | *Title:* | *Semi-elliptic membership functions and related arithmetic operations* |

| Time slot | Room B | Session 16 |
|---|---|---|
| 13:40 - 14:00 | *Authors:* | Aşıcı Emel, Mesiar Radko |
| | *Title:* | *Some construction methods for uninorms on bounded lattices* |
| 14:00 - 14:20 | *Authors:* | Holčapek Michal, Bui Viec |
| | *Title:* | *Integral transforms on spaces of complete residuated lattice-valued functions* |
| 14:20 - 14:40 | *Authors:* | Kobza Vladimír |
| | *Title:* | *T-norms and means on bounded lattices* |
| 14:40 - 15:00 | *Authors:* | Kurač Zbyněk, Riemel Tomáš, Rýparová Lenka |
| | *Title:* | *Transfer-stable aggregation functions on finite lattices* |

| 15:20 - 15:50 | COFFEE BREAK |
|---|---|

| 16:30 - 17:30 | FOOTBALL MATCH |
|---|---|

| 19:00 - 23:30 | GALA DINNER |
|---|---|

# FRIDAY, JANUARY 31

| INVITED TALK | |
|---|---|
| 9:30 - 10:30 | *Speaker:* Asmuss Svetlana |
| | *Title:* *Approximation techniques and approximate methods: Current state and perspectives of fuzzy logic based approaches* |

| 10:30 - 11:00 | COFFEE BREAK |
|---|---|

| INVITED TALK | |
|---|---|
| 11:00 - 12:00 | *Speaker:* Grzegorzewski Przemysław |
| | *Title:* *Statistics and Fuzzy Sets: Interrelations, Perspectives and Problems* |
| 12:00 - 12:15 | CLOSING CEREMONY |

| 12:15 - 13:30 | LUNCH |
|---|---|