

Seminár Aká si mi krásna

## Množiny, množiny...

Beloslav Riečan

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Émile Borel (1871 – 1956)

Nikolaj Podtjagin (1887 – 1970)

Vladimir Steklov (1864 – 1926)

Andrej Kolmogorov (1903 – 1987)

Čo je jav ?

Jav je množina

pravdepodobnosť = miera

náhodná veličina = merateľná funkcia

stredná hodnota = integrál

Jan Lukasiewicz (1878 - 1956)

$$A \oplus B = \min(A + B, 1)$$

$$A \odot B = \max(A + B - 1, 0)$$

L. A. Zadeh: Fuzzy sets. In: Information and Control 8, No. 3, 1965, 338 – 353.

L. A. Zadeh: Probability measures of fuzzy sets. J. Math. Analysis and Applications, 23, No 2, 1968, 421 – 427.

1980 Elena Bosáková

2016 Elena Karabinošová

1985 Ján Chmúrny

VVTŠ – matematické semináre

Reálna a funkcionálna analýza – Blahoslav Harman

Dynamické systémy – Peter Maličský

Pravdepodobnostné metódy – Beloslav Riečan



Liptovský Mikuláš

Ostrava

Poznaň

Teória a aplikácie fuzzy množín

Česko – slovensko – poľské konferencie

1987, 1988, 1989, 1990

Štefan Zná́m (1936 – 1993)

Igor Kluvánek (1931 – 1993)

PROBASTAT

1984

1987

1989

Jaroslav Smítal

FSTA

Fuzzy Set Theory and Applications

1.

1992

14.

2018

P. Maličký, B. Riečan: On the entropy of dynamical systems. Proc. Conf. Ergodic Theory and related Topics. Teubner, Leipzig 1986, 135 – 138.

B. Riečan, T. Neubrunn: Integral, Measure, and Ordering, Kluwer, Dordrecht 1997

F. Kôpka: D- posets of fuzzy sets. Tatra Mt. Mat. Publ. 1, 1992, 83 - 87.

F. Kôpka, F. Chovanec: D-posets. Math. Slovaca 44, 1994, 21 – 34.

D. J. Foulis, M. K. Bennett: Effect algebras and unsharp quantum logics. Found. Phys. 24, 1994, 1325 – 1346.

K. Atanassov: Intuitionistic Fuzzy Sets. Springer, Berlin 1999.

P. Grzegorzewski, E. Mrowka: Probability on intuitionistic fuzzy sets.  
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B. Riečan: A descriptive definition of probability on intuitionistic fuzzy sets. Proc. EUSFLAT 2003, Zittau 2003, 263 – 266.

B. Riečan: On a problem of Radko Mesiar: general form of IF-probabilities. Fuzzy Sets and Systems 157, 2006, 1485 – 1490.

L. Ciungu, B. Riečan: General form of probabilities on IF-sets. Fuzzy Logic and Applications. Proc. WILF Palermo 2009, 101 – 107.

B. Riečan: Analysis of Fuzzy Logic Models. In: Intelligent Systems (ed. M. Koleshko) INTECH 2012, 219 – 244.

$$A = (\mu_A, \nu_A)$$

$$\mu_A : \Omega \rightarrow [0, 1], \nu_A : \Omega \rightarrow [0, 1]$$

$$\mu_A + \nu_A \leq \mathbf{1}_\Omega$$

$$A = (\mu_A, \nu_A), B = (\mu_B, \nu_B)$$

$$A \leq B \iff \mu_A \leq \mu_B, \nu_A \geq \nu_B$$

$$A = (\mu_A, \nu_A), B = (\mu_B, \nu_B)$$

$$A \oplus B = ((\mu_A + \mu_B) \wedge 1, (\nu_A + \nu_B - 1) \vee 0),$$

$$A \odot B = ((\mu_A + \mu_B - 1) \vee 0, (\nu_A + \nu_B) \wedge 1)$$

Aditivita

$$A \odot B = (0, 1) \implies m(A \oplus B) = m(A) + m(B)$$

## Reprezentácia

$\forall m \exists P, \exists \alpha \in [0, 1]$

$$m(A) = \int_{\Omega} \mu_A dP + \alpha(1 - \int_{\Omega} (\mu_A + \nu_A) dP)$$

$S \subset F \subset IF \subset MV$

$(G, +, \leq)$

$$a \leq b \implies a + c \leq b + c$$

MV-algebra  $[0, u] \subset G$

$$a \oplus b = (a + b) \wedge u$$

$$a \odot b = (a + b - u) \vee 0$$

Príklad.  $G = \mathfrak{R}$ ,  $MV = [0, 1]$



Vnorenje

$$IF \subset \mathbb{R}^2$$

B. Riečan, D. Mundici: Probability on MV-algebras. In Handbook of measure theory (E. Pap ed.), Elsevier 2002, 869 – 909.

## Product MV algebras

B. Riečan: On the product MV algebras. Tatra Mt. Mat. Publ.16, 1999, 143 – 149.

F. Montagna: An algebraic approach to propositional fuzzy logic. J. Logic. Lang. Inf 9, 2000, 91 – 124.

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F. Kôpka: Quasi product on Boolean D-posets. Int. J. Theor. Phys. 47, 2008, 26 – 35.

Daniel Kahnemann (1934)

Ján Šipoš (1947)

Integral with respect to a pre measure. *Mathematica Slovaca* 29, 1979, 141 – 156.

Tibor Neubrunn (1929 – 1990)

Ladislav Mišík (1921 – 2001)

**Ďakujem za pozornosť**