



### **Lech T. Polkowski - IRSS Fellow Plenary Speaker**

Polish-Japanese Academy of Information Technology & University of Warmia and Mazury, Poland

<http://dblp.uni-trier.de/pers/hd/p/Polkowski:Lech>

**Title of the talk:** Rough Sets of Zdzisław Pawlak, Rough Mereology and a Long Way Ahead. A Personal View ...

**Abstract:** Zdzisław Pawlak influenced our thinking about uncertainty by borrowing the idea of approximation from geometry and topology and carrying those ideas into the realm of knowledge engineering. In this way, simple and already much worn out mathematical notions, gained a new life given to them by new notions of decision rules and algorithms, complexity problems, and problems of optimization of relations and rules. In this note, the author would like to present his personal remembrances of Zdzisław Pawlak interlaced with discussions of highlights of research done by then, inspired by Zdzisław, and next, he will go to more recent results mostly on applications of rough mereology in behavioral robotics and classifier synthesis via granular computing. Finally, the author will give some hints about bibliographical items to outline some perspectives for research.

In more detail: we return to results in a sense 'ordered' by Zdzisław, among them, on topology of spaces of rough sets which were made complete by an appropriate choice of metrics. A warning: of course those spaces are infinite and induced by countably infinite information systems hence not immediately applicable. But as a bonus we include the Approximate Collage Theorem which gives conditions securing that a fractal object is approximated by a countably infinite information system (e.g., a grid sequence) with an assumed error.

Then, we elaborate a bit on mereology, another topic in a sense 'pointed to' by Zdzisław, which have been 'diffused' to rough mereology, a theory of partial containment. Among applications of that theory, we mention a geometry based on the betweenness predicate which allows for control of teams of intelligent agents and a kind of betweenness in data sets which allows for partitions of data sets into subsets and leads to a new kind of classifying algorithms.

**Biography:** Lech T. Polkowski graduated as MSc Eng. from Chemical Department of Warsaw University of Technology in 1969 and after a stay at the Polish Academy of Sciences as a doctoral student in Physical Chemistry, he graduated from Department of Mathematics, Mechanics and Computer Science of the Warsaw University as MSc in Theoretical Mathematics. A result from his Master Thesis is quoted in monographs on set-theoretic topology. He obtained a PhD in Mathematics in February 1982 with a thesis on infinite dimension theory and a result is quoted in monographs on Dimension Theory.

He lectured in years 1985-87 and 1990-91 at Math Department of Ohio University, Athens Ohio, US, and was a guest scholar at Vakgroep Informatika at Delftse Universiteit, the Netherlands, in 1988-89.

His works at that time were devoted to topology, published in *Fundamenta Mathematicae*, *Proc. Amer. Math. Soc.*, *Topology Proc.*, and to aspects of language: *Montague Grammars*, models of anaphoric resolution, in few booklets available at Koninklijke Bibliotheek, the Hague.

In 1992, in Poland, on advice of professor Helena Rasiowa, he started working on rough sets, with Zdzisław Pawlak. With Andrzej Skowron he wrote a number of papers on morphology of rough sets, fusion of information, also on approximating grammars, with Gheorghe Paun from Romanian Academy.

His individual contributions encompass also a formal theory of granulation of knowledge and a resulting approach to granular classifiers as well as work on spatial reasoning with applications to navigation and control of intelligent agents (e.g., mobile autonomous robots).

He collected results of research on rough mereology in monographs: *Approximate Reasoning by Parts* and *Granular Computing in Decision Approximation* (the latter with P. Artiemjew) both by Springer.

He is a Professor ordinary at Polish-Japanese Institute of IT, in Warsaw, and at the University of Warmia and Mazury, in Olsztyn, Poland. He served as a member of Program Committees or Advisory Boards of maybe 50 plus international conferences, including the first RSCTC conference in Warsaw which he co-organized. He served on Editorial Boards of Grammars (Kluwer, non-existing now), Fundamenta Informaticae as Deputy Editor's-in-Chief, now he serves on EB's of Paladyn. Int. J. Behavioral Robotics, JAMRIS (J. Automation, Mobile Robotics, Intelligent Systems), Trans. Rough Sets.

He authored over 240 papers with over 6000 citations (according to Google Scholar). He is glad that his book on *Rough Sets. Mathematical Foundations* by Springer helps people in rough sets for over 14 years having over 600 citations.