

Attachment No 3 to the Application for Entering the Habilitation Procedure - summary of professional accomplishments

1. Name: Włodzimierz Fechner.
2. Academic degrees:
 1. Master of Mathematics: University of Silesia, Institute of Mathematics, June, 1st. 2003.
The title of Master Thesis: *Functional Equations in Rätz Space* (in Polish),
Supervisor: Prof. dr hab. Roman Ger.
 2. PhD in Mathematics: University of Silesia, Institute of Mathematics, July 2nd 2007.
The Title of Dissertation: *Functional Inequalities Connected with Quadratic Functionals* (in Polish),
Supervisor: Prof. dr hab. Roman Ger.
3. Information about the employment in scientific institutions:
 1. March 15, 2007 - June 30, 2007: research-and-teaching assistant (part-time employment), University of Silesia, Institute of Mathematics.
 2. October 1st, 2007 - now: assistant professor (full post), University of Silesia, Institute of Mathematics.
4. The scientific achievement spoken of in a respective act of Polish law.
 - (a) The monographic set of publications entitled *Functional Inequalities in several variables*.
 - (b) The list publications of the monographic set of publications:
 - [F1] Włodzimierz Fechner, *Functional characterization of a sharpening of the triangle inequality*, Math. Inequal. Appl. 13/3 (2010), 571–578.
 - [F2] Włodzimierz Fechner, *On some composite functional inequalities*, Aequationes Math. 79/3 (2010), 307–314.



- [F3] Włodzimierz Fechner, *Four inequalities of Volkmann type*, J. Math. Inequal. 5/4 (2011), 463–472.
- [F4] Włodzimierz Fechner, *A note on alienation for functional inequalities*, J. Math. Anal. Appl. 385 (2012), 202–207.
- [F5] Włodzimierz Fechner, *Hlawka's functional inequality*, Aequationes Math. (2012) doi=10.1007/s00010-012-0178-2.
- [F6] Włodzimierz Fechner, *Inequalities connected with averaging operators*, Indagationes Math. 24 (2013), 305–312.
- [F7] Włodzimierz Fechner, *Functional inequalities motivated by the Lax-Milgram theorem*, J. Math. Anal. Appl. 402 (2013), 411–414.
- (c) The description of the scientific goal of the foregoing papers and results obtained, jointly with their potential applications:

The aim of the monographic set of publications is to examine some problems of functional inequalities in several variables, its applications and connections with other mathematical disciplines. Solutions of the posed problems are contributions of the habilitation candidate to the development of the theory of functional inequalities. Tools and the proof techniques applied are far from standard methods used for solving similar problems and are additional contributions of the habilitation candidate to the development of this theory. Moreover, this set of publications reveals new connections between the theory of functional inequalities and elements of operator theory and of multifunction theory.

Introduction.

We begin with a short description of two most basic functional inequalities being a building blocks in our research, namely the inequality defining Jensen convex functions and the inequality defining subadditive functions. The latter one plays the crucial role in our further research.

Assume that $(X, +)$ is an Abelian semigroup with unique division by two, $D \subset X$ is a set such that $\frac{1}{2}(x + y) \in D$ for all $x, y \in D$ and $f: D \rightarrow \mathbb{R}$ is an arbitrary function. We say that f is *Jensen convex*, if

$$f\left(\frac{x+y}{2}\right) \leq \frac{f(x) + f(y)}{2}, \quad x, y \in D.$$

