

## WŁADYSŁAW ORLICZ (1903–1990) – POLISH MATHEMATICIAN

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**Abstract.** This is a brief biography of the Polish mathematician Władysław Orlicz (mostly known for Orlicz spaces), one of the members of the famous Lwów School of Mathematics (Polish School of Analysis in Lwów) who after World War II organized the Poznań School of Mathematics. This biography also includes his scientific achievements and many official scientific activities (honors and awards, membership in various scientific societies and editorial boards). There is a special section about Orlicz's connection to China and Chinese mathematicians.

**Władysław Roman Orlicz** was born on 24 May 1903 in Okocim, a village in the district of Brzesko, province of Cracow (it was at that time in Galicia in Austria-Hungary

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2000 *Mathematics Subject Classification*: Primary 01A72; Secondary 46-03.

A clarification on the use of Lwów is in order. When, after almost 150 years of subjugation under the Austro-Hungarian Empire, Poland reemerged in 1918 as an independent state at the conclusion of World War I, the city was called Lwów, and the name dates back at least to the thirteenth century. It was a Polish city in the period 1387–1772 since Galicia was ruled by Poland and in the period 1772–1918 by the Austro-Hungarian Empire. Eastern Poland, including Lwów, was occupied at the onset of the World War II by the Soviets in 1939 per the terms of their alliance with the Nazis. After German's broke of the non-aggression pact with the Soviets, the Nazis occupied Lwów in 1941. The Soviets reoccupied Lwów in 1944, and after the war it was annexed by the Soviet empire. From 1991 Lwów belongs to the independent state of Ukraine. The name Lvov is the English transliteration of the Russian name of Lwów, and one reason it is favored is because it appears in standard English and French dictionaries, and its pronunciation is very close to that of Lwów. The city is sometimes written as Lviv or L'viv, which are transliterations from the Ukrainian alphabet and are evidently closer to the Ukrainian name than Lvov. When Lwów was a part of Austria-Hungary and, briefly, Germany, it was called Lemberg. The Latin name was Leopoldis. Lwów is the preference of most Poles and I will use the original Polish version.

The paper is in final form and no version of it will be published elsewhere. The paper was translated into Chinese by Yuwen Wang and Shujan Shjshi and published (without photos) in *Mathematical Translations* **26** (2007), no. 2, 126–132.

and now is in Poland). His parents, Franciszek (1868–1907) and Maria née Rossknecht (1872–1952), had five sons: Kazimierz (1899–1945), Tadeusz (1900–1988), Władysław (1903–1990), Zbigniew (1905–1920) and Michał (1906–1978). His father died when he was only four years old.

In 1919 Orlicz's family moved to Lwów, where he completed his secondary education and then studied, firstly at the Technical University and after one year he studied mathematics at the Jan Kazimierz University in Lwów having Stefan Banach, Hugo Steinhaus and Antoni Łomnicki as teachers.

From 1922 to 1929 he worked as a teaching assistant at the Department of Mathematics of Jan Kazimierz University in Lwów. In 1928 he wrote his doctoral thesis "*Some problems in the theory of orthogonal series*" under the supervision of Hugo Steinhaus but his formal supervisor was Eustachy Żyliński. In the same year he married Zofia Krzysik (born: 26 September 1898, Foča, Bosnia – died: 5 November 1999, Poznań). In the late twenties and early thirties Orlicz worked as a teacher in private secondary schools and in a military school.



**Photo 1.** Göttingen 1929

Orlicz spent two years 1929 and 1930 at the Göttingen University, an excellent German academic center, on a scholarship in theoretical physics not in mathematics. During his stay in Göttingen he started his collaboration with Zygmunt Wilhelm Birnbaum, also from Lwów. They published two papers in *Studia Mathematica* in 1930 and 1931. Their results became a starting point for Orlicz to consider and investigate, in 1932 and 1936, function spaces more general than  $L^p$  spaces which later on became known as *Orlicz spaces*.

It should be emphasized clearly that from the functional analysis point of view (that is, as function spaces) Orlicz spaces appeared for the first time in 1932 in Orlicz's paper: *Über eine gewisse Klasse von Räumen vom Typus B*, Bull. Int. Acad. Polon. Sci. A 1932, No. 8/9, 207–220 with an additional condition on the function (the so called  $\Delta_2$ -condition for large  $u$ ), and in full generality (that is, without the  $\Delta_2$ -condition) in 1936. This was the reason why the term *Orlicz spaces* appeared in the papers by M. Morse and W. Transue (1950), and by A. C. Zaanen (1952). Orlicz spaces also appeared in the book by Zaanen in 1953.

In the years 1931–1937 Orlicz worked at the Lwów Technical University. In 1934 he was granted the "habilitation" (*veniam legendi*) for a thesis "*Investigations of orthogonal systems*".

Working in Lwów Orlicz participated in the famous meetings at the *Scottish Café* (Kawiarnia Szkocka) where Polish mathematicians: Stefan Banach (1892–1945), Hugo Steinhaus (1887–1972), Stanisław Mazur (1905–1981), Juliusz Paweł Schauder (1899–1943), Stanisław Ulam (1909–1984), Stefan Kaczmarz (1895–1939), Marek Kac (1909–

1985) and others: Herman Auerbach (1901–1942), Zygmunt Wilhelm Birnbaum (1903–2000), Maks (Meier) Eidelheit (1910–1943), Antoni Marian Łomnicki (1881–1941), Władysław Nikliborc (1899–1948), Stanisław Ruziewicz (1889–1941), Józef Schreier (1908–1943), Ludwik Sternbach (1905–1942) and Włodzimierz Stożek (1883–1941) had mathematical meetings. In these meetings also participated mathematicians from Warsaw: Karol Borsuk (1905–1982), Samuel Eilenberg (1913–1998), Kazimierz Kuratowski (1896–1980), Bronisław Knaster (1893–1980), Edward Szpilrajn-Marczewski (1907–1976), Stanisław Saks (1897–1942), Waclaw Sierpiński (1882–1969) and Alfred Tarski (1902–1983) who were discussing mathematics. They all talked about mathematical problems and looked for their solutions. The group gained international recognition and was later on named as the *Lwów School of Mathematics*.



**Photo 2.** Władysław Orlicz and his wife Zofia ( $\approx$  1939)

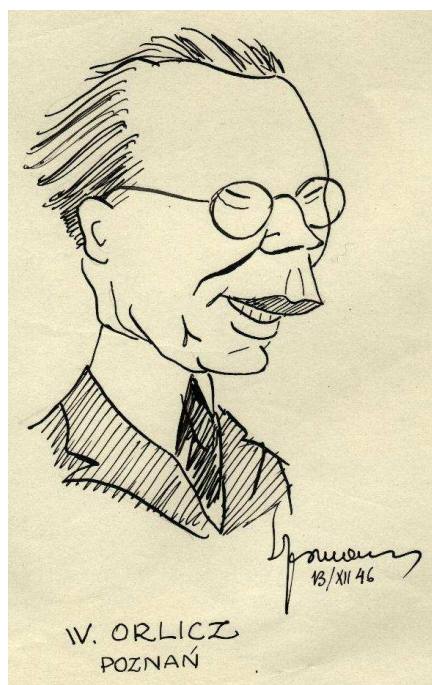
A collection of 193 mathematical problems from meetings at the Scottish Café appeared later on as the *Scottish Book*. Orlicz is the author or co-author of 14 problems in the book (R. D. Mauldin edited “*The Scottish Book, Mathematics from the Scottish Café*”, Birkhäuser 1981, which contains problems and commentaries written by specialists).

In 1968 when presenting the mathematical output of H. Steinhaus (in an article published in *Wiadom. Mat.* in 1969), Orlicz wrote

*In Lwów under the leadership of our dear masters Banach and Steinhaus we were practicing intricacies of mathematics.*

In 1937 Orlicz became professor at Poznań University (now Adam Mickiewicz University) and spent the Second World War in Lwów. He was a professor at the State University of Iwan Franko from January 1940 to June 1941 and from August 1944 to February 1945. He also taught at the school of commerce and handicrafts, and lectured at forestry courses. In March 1945 Orlicz went back to Poland and from May 1945 he returned to University of Poznań. In July 1948 Orlicz was promoted to an ordinary professor.

Let us say something about Orlicz’s connection to China and Chinese mathematicians. From 9 October 1958 Władysław Orlicz and Aleksander Pełczyński visited, for two months, the Mathematical Institute of Academia Sinica, Peking (Beijing). Orlicz delivered, in German language, a series of lectures on selected topics of functional analysis and A. Pełczyński had exercises. This was in the period 15 October–17 November 1958 and after that they visited other cities in China: Nanjing (17–20 Nov.), Shanghai (21–25 Nov.), Hangzhou (26–28 Nov.), Guangzhou (Canton; 29 Nov.–2 Dec.), Wuhan (Hankou; 3–4 Dec.) and then they went to Peking (5–9 Dec.) with their return to Poland on 9 Dec. 1958.



**Photo 3.** Orlicz's caricature from 1946



**Photo 4.** Poznań 1957. Antoni Zygmund and Władysław Orlicz

In several letters, to his wife Zofia, Orlicz wrote much about China in 1958. For example, some parts of his four letters are presented below:

– 10 Oct. 1958 (Friday): *I am writing a few words, already from Peking, from hotel "Peking" in which we are living. We started from Warsaw at 5 p.m. to Moscow. At the airport in Warsaw there was a mess, they gave us wrong luggage cards and an employee serving us was ignorant. Flight was quiet with a nice Moscow view at landing. Airport in Moscow: a mess, in comparison with which Warsaw was nothing. At 11 p.m. we started from Moscow and, after two stops, at 4 p.m. on Thursday we arrived in Peking. The world got smaller. After all welcomes and a supper at 9 p.m. we went to bed.*

– 20 Oct. 1958: *These first 10 days of a stay are tightly filled with sightseeings of different monuments in the city (palaces, parks) and outside the city (the Great Wall of China, various buddhist temples). We were also 3 times in a Chinese theater. I started my classes and had 4 hours of lectures. Pelczyński is doing exercises and the duties at the Institute.*

– 30 Oct. 1958: *Life I lead in order: getting up at 7.45 except Mondays and Fridays, when it is necessary to get up at 7, since I start the lecture on these days at 9.30 and journey by car takes at least 30 minutes (15 km). The seminar is held on Thursday at 14.30. I am lecturing from a ready manuscript (fortunately I did this work in Poznań). My lecture is translated into Chinese; moreover listeners have a copy of the text in Chinese. On the Seminar, the other way round, the content in Chinese is translated for me into German. I eat at a European restaurant. Academy provides 5 yuans daily for living expenses and this is enough. Complete lack of vegetables.*



**Photo 5.** 1958: W. Orlicz and A. Pelczyński with Chinese mathematicians



**Photo 6.** 1958: W. Orlicz, Fen-Fu Fen and A. Pelczyński in China



**Photo 7.** 1958: W. Orlicz and A. Pelczyński with Chinese mathematicians

– 2 Dec. 1958 (from Canton): *All the journey was perfect only I have too many impressions and chasing, and so tiredness is big enough. I am sitting now and looking at a huge Pearl river on which a hundred of junks and larger boats are running. This is my last look at the exoticism of Far East. Tomorrow we are going to Hankou where we will stay for two days. Then we return to Peking and after that to homeland on 9th December. It is not clear how long our return travel will take. It is different now in winter and sometimes it takes even 4 days.*

Orlicz's lectures in China, together with 75 exercises by Pelczyński, have been translated by Guan-Zhao Zhi and Li-Wen Qing, from German into Chinese, and published in Peking in 1963, with a preface of W. Orlicz as *Linear Functional Analysis*, Peking 1963, 138 pp. (in Chinese). This book greatly influenced the subsequent development of functional analysis in China, and in 1992 Orlicz's Chinese colleagues and students presented his book to the world's community in English *W. Orlicz, "Linear Functional Analysis"*, World Scientific, Singapore 1992, 262 pp. A translation was done in 1990–1991 by Lee Peng-Yee (Peng-Yee Lee) from the National University of Singapore and an "Addendum" with the new information on later developments of the theory of Orlicz spaces by Wu Congxin (Congxin Wu) from Harbin Institute of Technology. Unfortunately, Orlicz passed away in 1990, so he could not see the compilation of his book.



In China Orlicz also published, in 1959, two expository articles *Saks-space and its application in the theory of linear operators*, Acta Math. Sinica **9** (1959), 143–149 (in Chinese), where he reviewed what has been done in the theory of Saks spaces since they were first studied by S. Saks in 1932, together with a discussion of some unsolved problems and applications to the theory of linear operators, and *On the generalization of  $l^a$ -space and  $L^a$ -space*, Acta Math. Sinica **9** (1959), 150–155 (in Chinese), where he discussed some generalizations of Orlicz spaces introduced in a joint paper with S. Mazur (S. Mazur and W. Orlicz, *On some classes of linear spaces*, Studia Math. **17** (1958), 97–119) including the  $L^p$ -spaces for  $0 < p < 1$ . Both papers were then translated into English and published in Chinese Math. **9** (1967), 463–469 and **9** (1967), 470–475 (1968).



**Photo 8.** 1958: W. Orlicz with Chinese mathematicians

In 1960 Orlicz promoted one Chinese mathematician Guan-fu Chi, who defended his Ph. D. *Selected topics in the theory of vector-valued functions* in Poznań on 30 November 1960.

Orlicz, until his retirement in 1974, worked both at the Poznań University and at the Mathematical Institute of the Polish Academy of Sciences, Poznań Branch. Orlicz continued his seminar *Selected Problems of Functional Analysis* until 1989. The seminar ran every Wednesday from half past twelve to two o'clock in the Mathematical Institute. He was interested in the works of other mathematicians and in branches far removed from functional analysis. He addressed to participants of his seminar and other interlocutors using the characteristic phrase: *Panie Kolego* [this phrase comes from German language where it has an exact correspondence “Herr Kollege” but in English it is more difficult to find such a translation; nevertheless I translate it as “Dear Collague, Sir”].

Orlicz collaborated with several mathematicians. Collaboration with Mazur was especially fruitful. They wrote a dozen joint papers and their results are now considered classical theorems. In 1960 Hugo Steinhaus was writing about Banach and emphasised that (cf. [19], p. 157; 257, 242, and 13, 884, respectively):

*Mazur and Orlicz are direct pupils of Banach; they represent the theory of operations in Poland. Their names to be seen today on the cover of “Studia Mathematica”, signify direct continuation of the Banach scientific program.*

K. Kuratowski [2, p. 40] has written about the creation of the Polish School of Mathematics stating that:

*functional analysis owes its magnificent development to Banach and his students, especially to Mazur, Orlicz and Schauder.*

Altogether Orlicz published 171 mathematical papers, about half of them in cooperation with several authors. He was the supervisor of 39 doctoral dissertations (I am number 37) and over 500 master’s theses. Orlicz published a book, already mentioned



**Photo 9.** 1958: W. Orlicz and A. Pełczyński at the Great Wall of China



**Photo 10.** 1958: W. Orlicz and A. Pełczyński with Chinese mathematicians

above, *Linear Functional Analysis*, Peking 1963, 138 pp. (in Chinese), which was translated into English and published in 1992 by World Scientific, Singapore. Orlicz is also a co-author of two school textbooks (more about them is written in [8]).

Orlicz participated in congresses of mathematicians in Oslo (1936), Edinburgh (1958), Stockholm (1962) and Warsaw (1983), and in many scientific conferences. He was invited to universities in Canada, China, Germany and Israel.

Orlicz was the Editor of *Commentationes Mathematicae* (1955–1990), and of *Studia Mathematica* (1962–1990), and President of the Polish Mathematical Society (1977–1979).

In 1956 Orlicz was elected a corresponding-member of the Polish Academy of Sciences and in 1961 its full member. Three universities (York University in Canada, Poznań Technical University and Adam Mickiewicz University in Poznań) conferred upon him the title of doctor *honoris causa*, in 1974, 1978 and 1983, respectively.

Orlicz was awarded many high state decorations, prizes, as well as medals of scientific institutions and societies, including the Stefan Banach Prize of the Polish Mathematical Society (1948), the Golden Cross of Merit (1954), the Commander's Cross of Polonia Restituta Order (1958),

Honorary Membership of the Polish Mathematical Society (1973), the Alfred Jurzykowski Foundation Award (1973), Copernicus Medal of the Polish Academy of Sciences (1973), Order of Distinguished Teacher (1977), Wacław Sierpinski Medal of the Warsaw University (1979), Medal of the Commission for National Education (1983) and the Individual State Prizes (second degree in 1952, first degree in 1966).



**Photo 11.**  
Władysław Orlicz in 1970

Orlicz's contribution is important in the following areas in mathematics: function spaces (mainly *Orlicz spaces*), orthogonal series, unconditional convergence in Banach spaces, summability, vector-valued functions, metric locally convex spaces, Saks spaces, real functions, measure theory and integration, polynomial operators and modular spaces.

**Orlicz spaces**  $L^\varphi = L^\varphi(\Omega, \Sigma, \mu)$  are Banach spaces consisting of all  $x \in L^0(\Omega, \Sigma, \mu)$  such that  $\int_\Omega \varphi(\lambda|x(t)|)d\mu(t) < \infty$  for some  $\lambda = \lambda(x) > 0$  with the *Orlicz norm*

$$\|x\|_\varphi^0 = \sup \left\{ \int_\Omega |x(t)y(t)|d\mu(t) : \int_\Omega \varphi^*(|y(t)|)d\mu(t) \leq 1 \right\}$$

or the *Luxemburg-Nakano norm*

$$\|x\|_\varphi = \inf \left\{ \lambda > 0 : \int_\Omega \varphi(|x(t)|/\lambda)d\mu(t) \leq 1 \right\}.$$

*Orlicz spaces*  $L^\varphi$  are a natural generalization of  $L^p$  spaces. They have very rich topological and geometrical structure; they may possess peculiar properties that do not occur in ordinary  $L^p$  spaces.

Orlicz's ideas have inspired research of many mathematicians. In recent decades those spaces have been used in analysis, constructive theory of functions, differential equations, integral equations, probability, mathematical statistics, etc. The monographs on Orlicz spaces (including two books in Chinese language published in Harbin) are:

- M. A. Krasnoselskiĭ and Ya. B. Rutickii, *Convex Functions and Orlicz Spaces*, Moscow 1958 (Russian); English transl. Groningen 1961; Chinese transl. 1962.
- J. Lindenstrauss and L. Tzafriri, *Classical Banach Spaces I, II*, Springer 1977, 1979.
- C. Wu and T. Wang, *Orlicz Spaces and their Applications*, Heilongjiang Science and Technology Press, Harbin 1983 (Chinese).
- A. C. Zaanen, *Riesz Spaces II*, North-Holland 1983.
- C. Wu, T. Wang, S. Chen and Y. Wang *Theory of Geometry of Orlicz Spaces*, Harbin Institute of Technology Press, Harbin 1986 (Chinese).
- L. Maligranda, *Orlicz Spaces and Interpolation*, Campinas, SP 1989.
- M. M. Rao and Z. D. Ren, *Theory of Orlicz Spaces*, Marcel Dekker 1991.
- S. Chen, *Geometry of Orlicz Spaces*, Dissertationes Math. 356, 1996.
- M. M. Rao and Z. D. Ren, *Applications of Orlicz Spaces*, Marcel Dekker 2002.

The term *Orlicz spaces* appeared in the sixties in the Mathematics Subject Classification index of the American Mathematical Society in Section **46B35**, which is now **46E30**, *Spaces of measurable functions ( $L^p$ -spaces, Orlicz spaces, etc.)*.

To emphasize the importance of Orlicz spaces in a jocular way, Professor Orlicz used to say that when he was occasionally asked:

*Why are Orlicz spaces "better" than  $L^p$  spaces?*

he liked to answer:

*Tell me first why  $L^p$  spaces are "better" than  $L^2$ ?*

Here is another anecdote in connection to Orlicz spaces:



charakterystycznymi  $e_i$ . Oznaczając  $h(s(t)) = \sum_1^n h(a_i) \chi_{e_i}(t)$  3

2. Wprowadzamy następujące oznaczenie dla  $x \in S$

$$\gamma(x) = \int_T x(t) d\mu, \quad \gamma_\varphi(x) = \int_T \varphi(x(t)) d\mu, \quad \left( \int_T \varphi(x(t)) d\mu = \int_T \varphi(x(t)) d\mu \right).$$

Jak wiadomo  $\gamma_\varphi(x)$  jest w  $S'$  modularnym w sensie [ ].

Oznaczamy

$$L^{*\varphi} = \{x \in S : \gamma_\varphi(\lambda x) < \infty \text{ przy pewnym } \lambda > 0\},$$

$$L_\varphi^{*\varphi} = \{x \in S : \gamma_\varphi(\lambda x) < \infty \text{ przy każdym } \lambda > 0\},$$

$$K^\varphi = \{x \in L^{*\varphi} : \gamma_\varphi(x) \leq 1\}, \quad K_\varphi^\varphi = \{x \in L_\varphi^{*\varphi} : \gamma_\varphi(x) \leq 1\}.$$

Jak wiadomo  $L^{*\varphi}$  jest przestrzenią wektorową przy standardowych działaniach na funkcjach i przy określaniu równości  $x=y$  w sensie równości  $x(t)=y(t)$   $\mu$ -prawie wszędzie w  $T$ .

W  $L^{*\varphi}$  można określić  $\varphi$ -normę zupełną przyjmując

$$\|x\|_\varphi = \inf \{ \varepsilon > 0 : \gamma_\varphi(x/\varepsilon) \leq \varepsilon \}.$$

$L_\varphi^{*\varphi}$  (przestrzeń elementów skoczonych) jest podprzestrzenią wektorową  $L^{*\varphi}$ , domkniętą względem normy  $\|x\|_\varphi$ .

Relacja  $\|x_n\|_\varphi \rightarrow 0$  jest równoważna z relacją  $\gamma_\varphi(\lambda x_n) \rightarrow 0$  przy każdym  $\lambda > 0$ . Oznacza zbliżenie normowe w  $L^{*\varphi}$  uważa się zbliżenie modularne. Ciąg  $(x_n) \subset L^{*\varphi}$  nazywamy modularnie zbliżonym do  $x \in L^{*\varphi}$ , w symbolach  $x_n \rightarrow x$ ,

Photo 12. The facsimile of Orlicz's paper

Professor Orlicz had a small apartment and he once applied to the city administration for a bigger one. The answer of an employee was:

*Your apartment is really small but we cannot accept your claim since we know that you have your own spaces!*

In China investigation of Orlicz spaces is popular, mainly in Harbin and Beijing. In 1978, after the cultural revolution, Tingfu Wang came, as professor, to the Harbin University of Science and Technology and met at the Harbin Institute of Technology Prof. Congxin Wu. They both managed to build a research group specializing in functional analysis and related branches of mathematics. In 1985 Professor Shutao Chen, collaborator of Wang, came into contact with Professor Władysław Orlicz. Chen conveyed results obtained by the Harbin group under Wu and Wang supervision. These new and deep results concerning geometry of Orlicz spaces were greatly admired by Orlicz. In 1986 Professors Congxin Wu and Tingfu Wang, and their pupils Shutao Chen, Tiefu Liu and Yuwen Wang were invited to participate in the International Conference “Function Spaces” (Aug. 24-30, 1986) in Poznań organized by Professor Julian Musielak. They came to Poznań with, already mentioned, two books on Orlicz spaces in Chinese, published by Harbin in 1983 and 1986. Orlicz was very happy with these books and he showed them to anyone who visited him (I got copies of these books from Orlicz’s wife after his death in 1990). From 1986 three Chinese mathematicians (Wang, Wu and Chen) began a collaboration with the Poznań group of functional analysis concentrated around Professors Władysław Orlicz, Julian Musielak and Henryk Hudzik. Their cooperation with Polish mathematicians was very fruitful and many joint articles appeared in well known international mathematical journals. This cooperation of Harbin with Poznań in Orlicz and Musielak-Orlicz spaces remains to the present day (cf. [1]). General surveys on the contribution of Chinese and Harbin mathematicians, including joint papers with mathematicians from Poland, to Orlicz and Musielak-Orlicz spaces together with their applications are presented in papers [20] and [21].

*Orlicz’s name* is associated not only with the Orlicz spaces but also with the Orlicz-Pettis theorem, Orlicz property, Orlicz theorem on unconditional convergence in  $L^p$ , Mazur-Orlicz bounded consistency theorem, Mazur-Orlicz theorem on inequalities, Mazur-Orlicz theorem on uniform boundedness in F-spaces, Orlicz category theorem, Orlicz interpolation theorem, Orlicz norm, Orlicz function, convexity in the sense of Orlicz, F-norm of Mazur-Orlicz, Drewnowski-Orlicz theorem on representation of orthogonal additive functionals and modulars, Orlicz theorem on Weyl multipliers, Matuszewska-Orlicz indices, Hardy-Orlicz spaces, Marcinkiewicz-Orlicz spaces, Musielak-Orlicz spaces, Orlicz-Sobolev spaces and Orlicz-Bochner spaces.

For example, the Orlicz-Pettis theorem says that in Banach spaces the classes of weakly convergent subseries and norm unconditionally convergent series coincide. The Orlicz theorem on unconditional convergence in  $L^p$  is:

If  $1 \leq p < \infty$  and  $\sum_{n=1}^{\infty} f_n$  is unconditionally convergent in  $L^p$ , then

$$\sum_{n=1}^{\infty} \|f_n\|^{\max(p, 2)} < \infty.$$



**Photo 13.** Poznań Aug. 31, 1989. Conference “Function Spaces”. Left to right: Henryk Hudzik, Władysław Orlicz, Julian Musielak



**Photo 14.** Poznań 1989. Left to right: Carlos Finol, Francisco Hernandez, Władysław Orlicz, Lech Maligranda, Witold Wnuk

In 1988, on the occasion of Orlicz’s 85-th birthday, Polish Scientific Publishers (PWN) published his *Collected Papers* [17] in two volumes with a total of 1754 pages, reproducing 141 his articles from 1926–1985.

Orlicz’s scientific achievements are presented in detail in the papers by Maligranda-Matuszewska [15], Maligranda-Wnuk [12] and Maligranda [3]. Paper [12] contains a complete list of Orlicz’s publications (171 papers and 3 books; see [13]). Orlicz once said:

*Mathematics is a free flow of thoughts and concepts which a mathematician, in the same way as a musician does with the tones of music and a poet with words, puts together into theorems and theories.*

In the late seventies Orlicz started to collect information about mathematicians from Lwów and he was planning to write a book on the *History of the Lwów School of Mathematics* (he published only two articles: *The Lwów School of Mathematics between the Wars*, Wiadom. Mat. **23** (1981), 222–231 (in Polish) and *Achievements of Polish Mathematicians in the Domain of Functional Analysis in the Years 1919–1951* (see [17], pp. 1616–1641), and biographies of Stefan Banach, Stefan Kaczmarz, Antoni Łomnicki, Stanisław Mazur, Juliusz Paweł Schauder. It is a real pity that he did not realize this project.

Orlicz died on 9 August, 1990 in Poznań at 10.30 p.m. when correcting the galley proofs of his last paper accepted for publication in *Mathematica Japonica*.



**Photo 15.** Orlicz Memorial Conference, Oxford (USA) 1991. Left to right: James E. Jamison, Nigel J. Kalton, Stephen Montgomery-Smith, James W. Roberts, Lech Maligranda, Pei-Kee Lin, Iwo Labuda, James Porter, Anna Kamińska, Christopher Lang, Marek Nawrocki, Gerard Buskes, Elias Saab, Joe Diestel, Mohamed A. Khamsi, Michael M. Neumann, Alan Paterson, Tom Burton

Four conferences were organized in the memory of Władysław Orlicz:

1. *Orlicz Memorial Conference* (March 21–23, 1991) by the University of Mississippi in Oxford, USA. About fifteen lectures were presented. They are published in *Proceedings of the Orlicz Memorial Conference*, Oxford, MS, USA 1991.

2. *Function Spaces V* (28 August to 2 September, 1998) by the Adam Mickiewicz University in Poznań, Poland. Lectures and biography [11] appeared in the proceedings of this conference by Marcel Dekker in 2000.

3. *Scientific Session in the Memory of Professor Władysław Orlicz* (September 27–29, 2000) by the Adam Mickiewicz University and the Institute of Mathematics of the Polish Academy of Sciences in Będlewo, Poland. The proceedings, including the paper [3] with over forty photos of Orlicz, appeared in 2002.

4. *The Władysław Orlicz Centenary Conference and Function Spaces VII* (July 21–25, 2003) by the Adam Mickiewicz University, Institute of Mathematics of the Polish Academy of Sciences, Polish Mathematical Society, and the Poznań University of Technology in Poznań, Poland. Each participant of the conference obtained a nice CD [13] with the extensive presentation of Orlicz's life and his mathematical achievements. The proceedings are published as *Orlicz Centenary Volume* in the Banach Center Publications **64** (2004), 219 pp., including Orlicz's biography [14].





**Photo 16.** The Władysław Orlicz Centenary Conference and Function Spaces VII, Poznań, July 2003. Invited speakers and Program Committee

Every autumn since 1993, in order to commemorate Władysław Orlicz, the Faculty of Mathematics and Computer Science at the University of Adam Mickiewicz in Poznań organizes *the Władysław Orlicz Memorial Lectures*. Eminent Polish mathematicians are invited as speakers and they are awarded special *Orlicz Medals* of distinction. Up to now lectures were presented by: W. Narkiewicz, Z. Ciesielski, C. Olech, A. Pełczyński, A. Schinzel, K. Urbanik, S. Łojasiewicz, A. Lasota, B. Bojarski, S. Janeczko, S. Kwapien S. Woronowicz, H. Woźniakowski, J. Siciak, A. Hulanicki and A. Białynicki-Birula.

Information concerning the life and scientific activity of Władysław Orlicz is available at the following websites: [4], [6], [7], and a lot of his photos can be found in the publications: [3], [9] and [13].

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