

Jan Vilém Pexider (1874–1914)

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An experiment with the name Pexider

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AN EXPERIMENT WITH THE NAME PEXIDER

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When the Czech version of this book devoted to Jan Vilém Pexider was published, it contained a short note about bibliographical search related to Pexider. Since that time both main databases of mathematical literature, *MathSciNet* and *ZMath*, were completed and more recent material was included. Therefore I decided to rewrite the contribution, to shorten it and to include fresh data. They were obtained from the databases on October 4, 2008.

A word on the databases used is needed. Both of them were originally available in the form of journals publishing reviews of articles and books devoted to mathematics. MathSciNet is based on the journal *Mathematical Reviews* which started in 1940 and which contains now over 2,3 million items (and over 1 million direct links to original articles). ZMath (the database Zentralblatt MATH) has two predecessors of that type: *Jahrbuch über die Fortschritte der Mathematik* (1868 – 1942) and *Zentralblatt für Mathematik und ihre Grenzgebiete* (started at 1931). It contains now about 2.7 million entries drawn from about 3500 journals and 1100 serials from 1868 to the present time.

From the first point of view Pexider's generalization of the Cauchy's functional equation could seem to be not too deep and even quite insignificant. I have to admit that without the existence of the above mentioned databases I would not be able to make searches described below. On the other hand even with first electronic versions of databases some quite interesting investigations could be easily done. These searches show that when the study and use of functional equations started to be popular the frequency of Pexider equation in mathematical literature considerably increased.

About 10 years ago a simple search in MathSciNet (its version of that time) of the name "Pexider" returned 60 items. Now we receive 168 of them (an appearance when we use the key *anywhere*) and 90 of them are contained in the *titles* of articles. When we make a narrower search of "Pexider equation" or "Pexider functional equation" anywhere in reviewed works we receive almost 100 hits. We can also make this search more precise as for the time: searching in the years 1940–49, 1950–59, . . . , 1990–99, 2000–08, we receive successively numbers 0,0,1,8,7,32,26. This shows that the interest in the equation of Pexider type increased in recent years.

Such experiments are easy to perform but they could be time dependent. Missing reviews of articles are gradually added and number of reviewed journals increases. Hence the results of such searches are interesting but almost never they give us quite precise picture. Among other things our results heavily depend on the development of the whole discipline. Another search of "functional equation" (again with the key *anywhere*) gives us for ten years periods as above following numbers of hits: 191, 576, 1383, 2284, 2658, 2648, 2721. The growth of interest in the field of functional equations is visible from another

fact: among 92 books and proceedings from conferences containing “functional equation” in the title only 1 is published before 1959 while the number of those published in 1990-2008 is 49.

It was interesting that results obtained from analogous searches in ZMath are essentially the same even in case that works reviewed are more different than I expected. Thus the total number of occurrences of “Pexider equation” or “Pexider functional equation” anywhere in reviewed works is 180 (but now for the whole period of 140 years covered by the database). On the other hand due to the difference between the length of time covered we can detect 1 work of Pexider through MathSciNet (a work from 1903 which is quoted, not reviewed!) while in ZMath we are able to find 13 of them.

Many of pieces of information we obtained are closely related to the information explosion. This explosion is related among other things to the increase of the number of working mathematicians. But the results of searches show for sure that the field of functional equations is considerably growing in the recent years and that seemingly little discovery or generalization can have non-negligible impact on the development of this respectable theory.

Some other facts on the history and development of the theory of functional equations can be found in books quoted below.

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