Gazeta Matematică: international impact and visibility
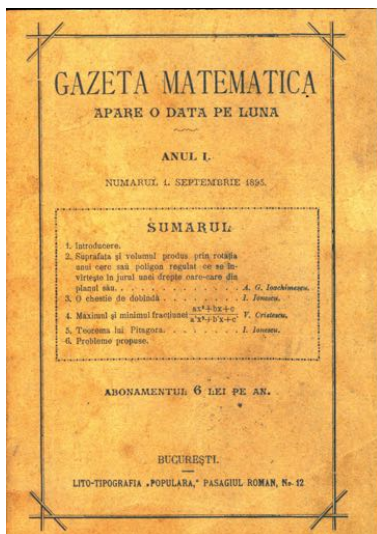
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ABSTRACT. In this paper we give a report on the international impact and visibility of the articles published in the prestigious Romanian monthly *Gazeta Matematică* during more than 121 years of existence (1895-present). The report is mainly based on those articles that were indexed in one, two or more of the following four databases: Zentralblatt MATH, Mathematical Reviews, SCOPUS and Web od Science.

1. INTRODUCTION

Gazeta Matematică is one of the oldest and most prestigious Romanian journals of mathematics with a continuous publication since its foundation in 1895. From the very beginning till today, *Gazeta Matematică* has been published as a true monthly, that is, with 12 issues each year, without any interruption, even during the World Wars I and II.

Cover of the first issue of *Gazeta Matematică* **(1895, left) and a recent issue 11/2014 (right).**

Amongst its many merits along the time, we mention: 1) the essential contribution for the establishment of an extraordinary mathematics competition atmosphere in Romania that led to the creation of the Romanian School of Mathematics; 2) creation of the IMO (**I**nternational **M**athematics **O**lympiad), nowadays the largest and most prestigious mathematics contest in the world for high school students (with 109 participating countries and 602 contestants in 2016, see https://www.imo-official.org/year_info.aspx?year=2016).

For more details on the history and main contributions of *Gazeta Matematică* we refer the reader to [1]-[14] and the papers cited there.

The aims of *Gazeta Matematică* as listed in the Foreword of its first issue from 1895 were the following two:

  (1) to publish original papers on mathematics;
  (2) to develop the taste for the study of mathematics and for doing original research.

So, with the only aim of developing the mathematical knowledge of high-school students, *Gazeta Matematică* has had actually an enormous influence on the whole mathematical life in Romania in the XXth century.

Both objectives were accomplished from the beginning by the two main parts that formed each issue of the journal:

  (1) first part until today is devoted to original papers or mathematical notes;
  (2) second part consists in a list of proposed problems (and solved problems as well).

Nowadays, after the journal has been split into two different series:

  • *Gazeta Matematică, seria B*, mainly devoted to elementary mathematics;
  • *Gazeta Matematică, seria A*, devoted to research articles on higher mathematics and mathematics education (didactics of mathematics),

most of the content of *Gazeta Matematică, seria B* is devoted to solved and proposed problems as well as to provide the list of solvers, while the part devoted to mathematics articles and notes represents about 30%. But these articles and notes are bringing in many cases real novelty at the level of elementary mathematics (according to secondary and high-school curricula in Romania) and could be of interest for people working in research and academia around the world.

It is possible now, by using the electronic version of *Gazeta Matematică*, available for the period (1895-2009), see http://magazin.ssmr.ro/index.php?main_page=product_info&c Path=73&products_id=225, to have a general view on the mathematical treasures that were collected by this journal. More specifically, during the period (1895-2009) more than 90,000 problems, mathematical notes and articles were published and are available on the CDs. We just mention a few names of the most productive authors of problems and articles who contributed to *Gazeta Matematică*, see [13] for more data.

Proposed problems: 1) Ionescu-Țiu, Constantin, D. (2289 problems); 2) Bătinețu-Giurgiu, Dumitru, M. (681); 3) Ionescu, Ion (635); 4) Panaitopol, Laurențiu (479); 5) Buicliu, Gh. (462); 6) Pârșan, Liviu C. (460); 7) Szöllössy, Gheorghe (368); 8) Chiriță, Marcel (349); 9) Doboșan, Aurel (284); 10) Simionescu, Gh. D. (279); 11) Linteș, Ioan Gheorghe (274).

Articles and notes: 1) Ionescu, Ion (421); 2) Buicliu, Gh. (191); 3) Chiriță, M. (169); 4) Teodorescu, Nicolae (146); 5) Linteș, I. G. (140); 6) Țițeica, Gabriela (108); 7) Sergescu, Petre C. (83); 8) Ionescu-Bujor, Constantin Th. (62); 9) Bencze, Mihaly (62); 10) Cristescu, V. (59).

In our study, we are going to report only on the impact of the articles published in *Gazeta Matematică* along the years, by considering their impact and visibility measured through four important databases (the periods they are covering are mentioned in brackets):

  • **Zentralblatt MATH** (1931-present); **Jahrbuch über die Fortschritte der Mathematik** (1868-1940);
  • **Mathematical Reviews (MathSciNet)** (1940-present);
  • **SCOPUS** (1996-present);
  • **Web of Science** (1990-present).

2. Gazeta Matematică indexed in Zentralblatt MATH

The journal *Gazeta Matematică* was indexed in Zentralblatt MATH under various names, in part due to the fact that during the communist period in Romania (1945-1989), the editors decided to change its name by following a soviet model (including physics as well) but also because different Zentralblatt editors adopted different names for the same journal when indexing it in different periods of time.

We present in the following the list of those names and also indicate the total number of articles reviewed in Zentralblatt MATH for each such name:

(1) Gaz. Mat., Bucur. (1041 articles reviewed; indexed in the periods 1901-1946 and 1975-1997);

(2) Gaz. Mat., Bucur., Ser. A (214 articles reviewed; indexed in the period 1964-1974);

(3) Gaz. Mat. Fiz., Bucur., Ser. A (210 articles reviewed; indexed in the period 1956-1963);

(4) Gaz. Mat., Perfecţ. Metod. Metodol. Mat. Inf. (157 articles reviewed; indexed in the period 1980-1992);

(5) Gaz. Mat., Ser. A (92 articles reviewed; indexed in the period 2009-2014);

(6) Gaz. Mat., Rev. Cult. Mat. (46 articles reviewed; indexed in the period 2000-2005);

(7) Gaz. Mat., Ser. Inf. Ştiinţ. Perfect. Metod. (24 articles reviewed; indexed in the period 1996-1998);

The first articles from *Gazeta Matematică* that were indexed in Zentralblatt MATH (actually in Jahrbuch über die Fortschritte der Mathematik, which has been later incorporated in Zentralblatt MATH) are the following ones (to get the correct Romanian names, read "J" as "I" into the authors names):

- Popovici, C., La spirale logarithmique comme figure d'équilibre. (French) JFM 32.0711.08 Bucarest Gazeta mat. 6, 60-61, (1901).
- Constantinescu, T., Sur les cercles inscrits ou circonscrits à des triangles inscrits ou circonscrits à une parabole. (French) JFM 32.0592.04 Bucarest Gazeta mat. 6, 173-177, 200-205, 224-228, 247-250, (1901).
- Jonescu, J., Équation de la normale d'une courbe. (French) JFM 32.0564.03 Bucarest Gazeta mat. 6, 271, (1901).
- Otescu, J., Sur les théorèmes de *Pascal* et de *Brianchon*. (French) JFM 32.0547.04 Bucarest Gazeta mat. 6, 77-79, (1901).
- Tzitzéica, G., Un problème de projection. (French) JFM 32.0530.14 Bucarest Gazeta mat. 6, 101-103, (1901).
- Jonescu, J., Casus ambiguus dans la résolution du triangle plan. (French) JFM 32.0519.08 Bucarest Gazeta mat. 6, 245-247, (1901).
- Tzitzéica, G., Application dun théorème de géométrie. (French) JFM 32.0518.16 Bucarest Gazeta mat. 6, 269-270, (1901).
- Lalescu, T., Quelques relations trigonométriques. (French) JFM 32.0446.03 Bucarest Gazeta mat. 6, 157-200, (1901).
- Joachimescu, A. J., Sur les valeurs asymptotiques d'une classe de séries divergentes. (French) JFM 32.0275.08 Bucarest Gazeta mat. 6, 7-10, 29-31, (1901).
- Joachimescu, A. J., Sur le triangle de Pascal. (French) JFM 32.0182.06 Bucarest Gazeta mat. 6, 104-106, (1901).

The total number of articles published in *Gazeta Matematică* that were reviewed in Zentralblatt MATH (+Jahrbuch über die Fortschritte der Mathematik) is really impressive: 1784 articles that cover a period of more than 100 years (1901-2015) !

By using the reports offered by Zentralblatt MATH database, we are able to present the distribution of these articles over the years.

2015 (1 article reviewed); 2014 (14 articles reviewed); 2013 (15 articles reviewed); 2012 (17 articles reviewed); 2011 (17 articles reviewed); 2010 (26 articles reviewed); 2009 (36 articles reviewed); 2008 (3 articles reviewed); 2005 (7 articles reviewed); 2004 (6 articles reviewed); 2003 (4 articles reviewed); 2002 (8 articles reviewed); 2001 (18 articles reviewed) 2000 (14 articles reviewed); 1998 (10 articles reviewed); 1997 (8 articles reviewed); 1996 (9 articles reviewed); 1995 (1 article reviewed); 1994 (7 articles reviewed); 1992 (17 articles reviewed); 1991 (2 articles reviewed); 1990 (10 articles reviewed); 1989 (35 articles reviewed); 1988 (54 articles reviewed); 1987 (24 articles reviewed); 1986 (24 articles reviewed); 1985 (18 articles reviewed); 1984 (15 articles reviewed); 1983 (19 articles reviewed); 1982 (16 articles reviewed); 1981 (12 articles reviewed); 1980 (22 articles reviewed); 1979 (13 articles reviewed); 1978 (12 articles reviewed); 1977 (6 articles reviewed); 1976 (19 articles reviewed); 1975 (11 articles reviewed); 1974 (27 articles reviewed); 1973 (27 articles reviewed); 1972 (29 articles reviewed); 1971 (18 articles reviewed); 1970 (22 articles reviewed); 1969 (30 articles reviewed); 1968 (22 articles reviewed); 1967 (27 articles reviewed); 1966 (37 articles reviewed); 1965 (21 articles reviewed); 1964 (20 articles reviewed); 1963 (19 articles reviewed); 1962 (39 articles reviewed); 1961 (32 articles reviewed); 1960 (32 articles reviewed); 1959 (44 articles reviewed); 1958 (48 articles reviewed); 1957 (22 articles reviewed); 1956 (29 articles reviewed); 1955 (3 articles reviewed); 1954 (7 articles reviewed); 1953 (6 articles reviewed); 1952 (6 articles reviewed); 1951 (24 articles reviewed); 1950 (8 articles reviewed); 1949 (2 articles reviewed); 1948 (2 articles reviewed); 1946 (12 articles reviewed); 1945 (9 articles reviewed); 1944 (8 articles reviewed); 1943 (25 articles reviewed); 1942 (29 articles reviewed); 1941 (36 articles reviewed); 1940 (36 articles reviewed); 1939 (42 articles reviewed); 1938 (27 articles reviewed); 1937 (37 articles reviewed); 1936 (26 articles reviewed); 1935 (66 articles reviewed); 1934 (54 articles reviewed); 1933 (22 articles reviewed); 1932 (37 articles reviewed); 1931 (44 articles reviewed); 1930 (79 articles reviewed); 1929 (89 articles reviewed); 1928 (38 articles reviewed); 1927 (42 articles reviewed); 1925 (71 articles reviewed); 1912 (3 articles reviewed); 1911 (3 articles reviewed); 1910 (7 articles reviewed); 1909 (6 articles reviewed); 1908 (3 articles reviewed); 1907 (9 articles reviewed); 1906 (6 articles reviewed); 1905 (9 articles reviewed); 1904 (7 articles reviewed); 1903 (7 articles reviewed); 1901 (11 articles reviewed).

We should also note that the most significant number of articles per one year reviewed in Zentralblatt MATH (+Jahrbuch über die Fortschritte der Mathematik) were published between the two World Wars: 1929 (89 articles); 1930 (79); 1935 (66); 1934 (54); 1931 (44); 1927 (42); 1928 (38); 1937 (37) etc.

3. GAZETA MATEMATICĂ INDEXED IN MATHEMATICAL REVIEWS (MATHSCINET)

Gazeta Matematică has been reviewed in Mathematical Reviews from the first year of existence of this reference publication (1940).

Like in the case of Zentralblatt MATH (+Jahrbuch über die Fortschritte der Mathematik), the journal *Gazeta Matematică* was indexed in Mathematical Reviews under various names, in part due to the fact, also mentioned in the previous section, that during the communist period in Romania (1945-1989), the editors decided to change its name by following a soviet model (including physics as well), but also due to Mathematical Reviews editors' own options.

We present in the following the various names that *Gazeta Matematică* bears în Mathematical Reviews:

- *Gaz. Mat.* (124 articles reviewed; from vol. 44 (1939) - vol. 54 (1949))
- *Gaz Mat., Bucureşti* (7 articles reviewed; from vol. 51 (1946) - vol. 54 (1949));
- *Gaz. Mat., Bucareşti* (2 articles reviewed; vol. 54 (1949));
- *Gaz. Mat. Fiz. Ser. A* (143 articles reviewed; from vol. 6 (59) (1954) - vol. 15 (68) (1963));
- *Gaz. Mat. Publ. Lunară Pentru Tineret* (28 articles reviewed; from vol. 80 (1975), no. 8 - vol. 83 (1978), no. 3);
- *Gaz. Mat. (Bucharest)* (92 articles reviewed; from vol. 84 (1979), no. 11- vol. 90 (1985), no. 7);
- *Gaz. Mat. Mat. Inform.* (18 articles reviewed; 1 (1980), no. 1 - 2 (1981), no. 1)

The first articles from *Gazeta Matematică* reviewed in Mathematical Reviews are (we write them as taken from MathScinet, by including the referee's name, if any, and the classification code):

- Bădescu, Radu, *On a problem of Goursat*. Gaz. Mat., 44 (1939), 571–577. (Reviewer: I. J. Schoenberg) 36.0X
- Gheorghiu, Gh. Th., *Obituary: George Ţiţeica*. Gaz. Mat., 45 (1939), 169–173, 281–288, 339–344, 396–405. 01.0X
- Thébault, V., *On a sphere connected with a tetrahedron*. (Roumanian) Gaz. Mat., 45 (1940), 292–295. 48.0X
- Abramescu, N., *Application of geometry to the discussion and separation of roots of an equation*. (Romanian) Gaz. Mat., 48 (1943). 6 pp. (Reviewer: I. J. Schoenberg) 09.0X
- Popoviciu, Tiberiu, *On indicators*. (Romanian) Gaz. Mat., Bucureşti, 51 (1946), 306–313. (Reviewer: I. Kaplansky) 10.0X
- Popoviciu, Tiberiu, *On some inequalities*. (Romanian) Gaz. Mat., Bucureşti, 51 (1946), 81–85. (Reviewer: R. P. Boas Jr.) 27.0X
- Vişa, E., *On the axiom of Pasch*. (Romanian) Gaz. Mat., Bucureşti, 51 (1946), 124–127. 48.0X
- Ionescu-Bujor, C., *On generalized polarities*. (Romanian) Gaz. Mat., Bucureşti, 51 (1946). 381–390. 48.0X
- Angheluţă, Th., *Circular transformations characterized by a functional equation*. (Romanian) Gaz. Mat., Bucureşti, 51 (1946). 94–98. (Reviewer: R. P. Boas Jr.) 39.0X
- Mangeron, Dumitru Ion, *On a class of differential equations of higher order*. (Romanian) Gaz. Mat., Bucureşti 52, (1947). 207–212. 36.0X
- Iacob, Caius, *On a necessary condition for the transformation into satellites of the planet of bodies projected from a planet*. (Romanian) Gaz. Mat., Bucureşti 54 (1949), 192–201. 85.0X.

Amongst the last articles from *Gazeta Matematică* that were reviewed in Mathematical Reviews we mention:

- Bătineţu, D. M.; Filip, Anne-Marie, *Reducing some nonlinear recurrent sequences to linear recurrent sequences*. (Romanian) Gaz. Mat. (Bucharest), 90 (1985), no. 7, 234–237.
- Micula, Gh., *Professor emeritus D. V. Ionescu 1901–1985*. (Romanian), Gaz. Mat. (Bucharest) 90 (1985), no. 7, 225–227.
- Benkö, Iosif, *Convexity seen from within and from without. II*. (Romanian), Gaz. Mat. (Bucharest), 90 (1985), no. 10, 372–375.
- Iacob, Caius, *On the theorem of Menelaus*. (Romanian) Gaz. Mat. (Bucharest), 90 (1985), no. 9, 322–329.

The total number of articles published in *Gazeta Matematică* that were reviewed in Mathematical Reviews is 414 (covering the period 1939-1985). Starting from 1985, *Gazeta Matematică* is no more indexed in Mathematical Reviews (for reasons that are not discussed here).

The data extracted from the two most important mathematical databases (Zentralblatt MATH and Mathematical Reviews) mainly illustrate the *international visibility* of the journal *Gazeta Matematică*. In part, from MathSciNet, we can also get some information on their impact, too. For example, the article

Popoviciu, T., *On some inequalities*. (Romanian), Gaz. Mat., Bucureşti 51, (1946). 81–85.

has one citation from the References lists in MathScinet.

In order to emphasize the *international impact* of the journal *Gazeta Matematică*, we present a synthesis of the data offered by the two general databases (SCOPUS and Web of Science) considered in this study.

Note that, the most significant contribution of *Gazeta Matematică*, i.e., *its visibility* and *impact* at a national level in Romania, is really huge and cannot be measured by any bibliometric tool, see [1]-[14], for more data and facts.

4. Gazeta Matematică as viewed through SCOPUS

For various reasons, amongst which we mention the fact that most of the published articles were written in Romanian, the impact of the articles published in *Gazeta Matematică* is rather modest and totalize about 150 citations in SCOPUS.

The most cited articles that were published in *Gazeta Matematică* according to SCOPUS database (as by 11 November 2016) are:

- Popoviciu, T., *On an inequality*, Gaz. Mat. Fiz. Ser. A., 64 (1959), no. 11, 451–461 (Times Cited: **31**)
- Vernescu, A., A new accelerate convergence to the constant of Euler, Gazeta Matem. Ser. A, Bucharest, 104 (1999), no. 4, 273–278 (Times Cited: **18**)
- Vernescu, A., *The order of convergence of the sequence that defines the constant of Euler*, Gazeta Matem Ser. A, Bucharest, 88 (1983), no. 10-11, 380–381 (Times Cited: **11**)
- Negoi, T., *A faster convergence to the constant of Euler*, Gazeta Matematica, Ser. A, 15 (1997), 111–113 (Times Cited: **11**)

We should also note that the most cited author in SCOPUS who contributed to *Gazeta Matematică*, i.e., T. Popoviciu (1906-1975), is very actual by his papers that continue to be of current research interest: there are 66 papers indexed in SCOPUS that include Popoviciu's name in Article Title, Abstract or Keywords and 34 papers that include Popoviciu's name in Article Title. These last articles were published in the previous 11 years: 2016 (5 articles); 2015 (6 articles); 2013 (3 articles); 2012 (1 article); 2011 (1 article); 2010 (4 articles); 2009 (2 articles); 2008 (3 articles); 2007 (3 articles) and 2005 (1 article) etc.

5. Gazeta Matematică as viewed through Web of Science

For various reasons, amongst which is the fact that most of the articles were written in Romanian, the impact of the articles published in *Gazeta Matematică* is rather modest and totalize about 170 citations in Web of Science.

The most cited articles published in *Gazeta Matematică* according to Web of Science database (as by 11 November 2016) are:

- Popoviciu, T., *On an inequality*, Gaz. Mat. Fiz. Ser. A., 64 (1959), no. 11, 451–461 (Times Cited: **28**)

- Vernescu, A., *A new accelerate convergence to the constant of Euler*, Gazeta Matem. Ser. A, Bucharest, 104 (1999), no. 4, 273–278 (Times Cited: **15**)
- Negoi, T., *A faster convergence to the constant of Euler*, Gazeta Matematica, Ser. A, 15 (1997), 111–113 (Times Cited: **9**)
- Vernescu, A., *The order of convergence of the sequence that defines the constant of Euler*, Gazeta Matem Ser. A, Bucharest, 88 (1983), no. 10-11, 380–381 (Times Cited: **8**)

For the most cited Web of Science author of *Gazeta Matematică*, i. e., Tiberiu Popoviciu, we find more than 445 citations in Web of Science to his papers, but most of them were published in more visible journals than *Gazeta Matematică*. His most cited papers in Web of Science are:

- Popoviciu, T., *Sur l'approximation des fonctions convexes d'ordre superieur*, Mathematica (Cluj), 10 (1935), 49–54 (Times Cited: **38**)
- Popoviciu, T., *Sur quelques proprietes des fonctions d'une ou de deux variables réelles*, Mathematica (Cluj), 8 (1934), No. 1, 1–85 (Times Cited: **38**)
- Popoviciu, T., *Les fonctions convexes*, Hermann et Cie, Paris, 1944 (Times Cited: **36**)
- Popoviciu, T., *Sur certaines inégalités qui caracterisent les fonctions convexes* (Romanian), An. Sti. Univ. Al. I. Cuza Iasi Sect. I a Mat., 11B (1965), 155–164 (Times Cited: **23**)

6. Conclusions

Even though the international impact and visibility of *Gazeta Matematică*, as illustrated by the data collected in this note, could not be very impressive, its real international impact and visibility would be correctly measured only if we would be able to estimate the total number of mathematicians of Romanian origin around the world who benefited, directly or indirectly, from the existence and activity of the journal *Gazeta Matematică* during their own mathematics education period.

On the other hand, it is now clear from the data we have presented above that the journal has been not continuously and completely reviewed by Zentralblatt MATH and / or Mathematical Reviews.

Moreover, it is mostly regrettable that *Gazeta Matematică* has not been reviewed by Mathematical Reviews in modern times for more than twenty years (1985-2016).

Therefore, it is an imperative task for the current editors of *Gazeta Matematică* to take care and ensure resuming the reviewing process and full coverage in both Zentralblatt MATH and Mathematical Reviews.

This would enable a better international impact and visibility for the papers published in this prestigious journal which is indeed "a bridge over three centuries" as inspiredly I have titled the collection of problems selected from *Gazeta Matematică* to form the book [6], distributed amongst the participants to the 10th Congress on Mathematics Education, Copenhagen, 4-11 July 2004.

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