

J. Vicente Gonçalves and the “Journal of the Faculty of Sciences of Lisbon University”: A contribution to the dissemination of Portuguese mathematical studies

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ABSTRACT

In this study we bring to light an initiative of J. Vicente Gonçalves – the creation of a scientific journal in 1950 – that promote the exchange of mathematical knowledge between Portuguese mathematicians and foreign mathematicians. We describe this journal. We present a list of the mathematicians who that published in this journal. We report a process developed by J. Vicente Gonçalves to make the exchange of institutional journal with one scientific publication. We present examples of scientific mathematical discussions motivated by the existence of this journal.

1. Introduction

The Portuguese Mathematician and Professor José Vicente Gonçalves (1896-1985) played a relevant role in the development of mathematical teaching and research in Portugal on the first half of the twentieth century.

J. Vicente Gonçalves taught almost 25 years in each of the biggest Portuguese universities: Coimbra University (1917-1942) and Lisbon University (1942-1967). In this last period he also taught at an important high school of economics (1947-1960).

He developed his professional activity, essentially, in three slopes, namely: of professor, of mathematician and of author. He had a great influence in the career of many Portuguese younger mathematicians and also in the divulgation of the work of Portuguese mathematicians to the foreign mathematics community.

In this study, we present, with some detail, one of his initiatives that contributed to develop the scientific communication between Portuguese mathematicians and foreign mathematicians. We are referring to the foundation of the (RFCUL-A) “*Revista da Faculdade de Ciências da Universidade de Lisboa, 2ª Série A (Ciências Matemáticas)*” (Journal of the Faculty of Sciences of Lisbon University 2nd Series A – Mathematical Sciences), created by him in 1950. He was its editor for many years. We will list several of the mathematicians (Portuguese and foreign) that have published their papers in the RFCUL-A. These aspects are discussed in second section.

As editor of this journal, J. Vicente Gonçalves established relations with other mathematicians, universities and research institutes to exchange the RFCUL-A with the publication of those institutions. We will present an example of these contacts in third section.

Furthermore, in fourth section we will exhibit three examples of exchange of mathematical knowledge that took place in this journal, between J. Vicente Gonçalves and other foreign mathematicians. One of them involves Alexander Ostrowski, other Oskar Perron and another concerning Evelyn Frank. The first example related with an

inequality due to W. Specht, the second one concerning continued fractions and the last one related to the roots of polynomial equations.

2. The Journal of the Faculty of Sciences of Lisbon University 2nd Series A (Mathematical Sciences) in numbers

The Journal of the Faculty of Sciences of Lisbon University 2nd Series (RFCUL-A) was a journal of scientific publication with an annual volume of two fascicles per Section (few exceptions). This publication accepted exchange with other scientific journals.

The Section A, of Mathematical Sciences of the Journal of the Faculty of Sciences of the University of Lisbon 2nd Series (hereinafter referred to as: RFCUL - A), was founded in 1950 by J. Vicente Gonçalves. Until then there were two sections, namely: the one of Physical and Chemical Sciences, and the one of Natural Sciences.

This Section of RFCUL left 15 volumes to its extinction in 1974. All volumes had two issues except for Volume IV and V. Volume IV was dedicated to Mira Fernandes by the occasion of his retirement.

J. Vicente Gonçalves was the editor of the Section of Mathematical Sciences until Volume IX (he was retired at the beginning of 1967). He was replaced first by António Gião in 1963 (Volume X to Volume XI - 1^o fascicle) and then by F. Veiga de Oliveira in 1965 (from Volume XI, 2^o fascicle).

For almost a quarter of a century, 40 Portuguese and 30 foreigners Mathematicians of different generations published in RFCUL – A. Namely: Aureliano de Mira Fernandes, José Sebastião e Silva, J. Ribeiro de Albuquerque, José Vicente Gonçalves, Peter Bruno Theodor Braumann (Pedro Braumann), António Almeida e Costa, Ricardo San Juan, Kiyoshi Iseki, J. Tiago de Oliveira, Renato Pereira Coelho, F. Veiga de Oliveira, F. R. Dias Agudo, Herbert Knothe, Vasco Osório, João Farinha, J. Levitzki, Maria Joana Veloso, A. César de Freitas, M. N. Murta, Ramos e Costa, Hugo Ribeiro, Ruy Luis Gomes, Victor Hugo de Lemos, A. Coimbra de Matos, J. J. Dionísio, E. J. Gumbel, E. G-Rodeja F., Maria Luísa Noronha Galvão, Evelyn Frank, António Gião, A. M. Ostrowski, R. O. Vicente, Margarita Ramalho, Baltasar R.-Salinas, Manuel Frias de Almeida e Sá, Domingos Passos Coelho, Tomé Pinho Gil, J. Campos Ferreira, J. Silva Oliveira, A. H. Gameiro Pais, J. M. S. Simões Pereira, A. Sade, Denise Huet, J. P. Girardeau, Jayme Machado Cardoso, J. Santos Guerreiro, João T. Mexia, Graciano Neves de Oliveira, Maria de Fátima Fontes de Sousa, José Francisco da Rosa Taborda, A. H. Gameiro Pereira, B. H. Neumann, Maria Hígina Rendeiro Marques, S. D. Bajpai, Hari Ballabh Mital, John Decicco, Robert V. Anderson, K. N. Mehra, L. K. Bhagchandani, R. L. Taxak, H. C. Gulati, R. U. Verma, S. C. Rastogi, A. A. Ali, Manilal Shah, Amílcar S. Gonçalves, Hari Karan Nath Trivedi, R. S. Dahiya, Umesh Chanders Vohra, K. D. Singh and Govind Pandey.

In the first volumes the authors were mostly Portuguese but this tendency changed with the years and in the last volumes the authors were predominantly foreigners.

Different areas of mathematics were treated in RFCUL – A, namely: Algebra Analysis, Geometry and Topology, Probability and Statistics, Logic and Foundations, Mathematical Physics and Applied Mathematics. Most of the subjects covered in this

journal were very recent at the time. The work of António Almeida e Costa and his disciples in Algebra, the development of the theory of continued fraction by João Farinha, J. Vicente Gonçalves and Evelyn Frank, are examples of scientific discussions present in the different volumes of RFCUL – A.

The papers were written mostly in foreign languages and many of the papers written in Portuguese had an extended abstract in another language (French, German or English). The foreign languages used were French, English, Italian, German and Spanish (in quantitative order), which is not surprising if we take into account the words of Gray (2002) on the subject:

“There were four languages for international use in mathematics around 1900. French and German because of the indigenous strength of the mathematics profession in those countries, English because of the strength of the British Empire and the growing power of the United States, and perhaps Italian, again, because there were so many good Italian mathematicians. The use of any other language raises questions about the intended communication of the paper or book and about the situation of the corresponding indigenous mathematical community.” (p. 204)

3. Institutional exchange of publications: an example

J. Vicente Gonçalves made a great effort to make known the RFCUL-A (and therefore the work of Portuguese mathematicians) and to exchange it with foreign scientific journals.

One of his strategies to attain this goal was writing to foreign mathematicians proposing the exchange of the publication of their university/institution, sending also some volumes of his journal.

Costa & Malonek (2007) made known a letter from the German mathematician Konrad Knopp (1882–1957) to J. Vicente Gonçalves, sent from Tübingen in 27 January 1955. This letter¹ constitutes an example of the referred strategy used by Gonçalves as we will describe.

The central subject of Knopp’s letter was the institutional exchange of scientific publications and was sent in response to a letter from J. Vicente Gonçalves, of 16 December 1954. In his letter, J. Vicente Gonçalves asked information about the exchange of RFCUL-A with o *Jahresbericht der DMV* (publication of the German Mathematician Association) and sent three volumes of RFCUL-A.

Knopp begins by thanking the letter of Vicente Gonçalves and the supply of the volumes. Next he mentions that they already have volumes I and II of RFCUL-A in their Math Institute. He reports what had done about the request of exchange of publications and informs J. Vicente Gonçalves about the next phases of the process, as the following statement from Knopp’s letter shows:

“(…) Ihre “Revista” sind auch in unserm Math. Institut vorhanden (Vol. I und II); es konnte aber nicht mehr festgestellt werden, an wen sie adressiert gewesen sind, an das Institut, an Herrn Prof. Kamke oder an die “Deutsche

¹ Donated by the heirs of J. Vicente Gonçalves to Department of Mathematics of Faculty of Sciences of Coimbra University (Portugal).

Mathematiker-Vereinigung" (DMV). Ich habe die Angelegenheit mit Herrn Prof. Kamke, der die Austausch-Angelegenheiten für das Institut erledigt, besprochen. Er ist gern bereit, Ihre "Revista" gegen den "Jahresbericht der (DMV)" einzutauschen, wofern er die dazu nötigen Mittel bewilligt erhält. Für den (sehr wahrscheinlichen) Fall, daß ihm das gelingt schreiben Sie uns doch bitte

- 1. an welche Adresse der "Jahresbericht" gerichtet werden soll, und*
- 2. welche stelle bei Ihnen die Sorge für die regelmabige Zusendung Ihrer "Revista" übernehmen wird. Beide Angaben sind für die Bewilligung der Tauschmittel notwendig."*² (Knopp 1955)

4. Exchange of mathematical knowledge: examples

In this section we present examples of exchange of mathematical knowledge between J. Vicente Gonçalves and three relevant mathematicians of the international community. These examples show some scientific mathematical discussions motivated by the existence of the RFCUL-A.

4.1. J. Vicente Gonçalves and Alexander Ostrowski (Costa & Vitória 1997), (Costa 2001, pp. 198-200)

In the first volume of RFCUL-A (1950) appears the paper "L' Inégalité de W. Specht" by J. Vicente Gonçalves. In this paper the author presents an inequality that is an improvement of one by (Landau and) Specht on bounds for the roots of polynomials.

D. S. Mitrinovic (1970, pp 223-224) made reference to this paper in his book "Analytic Inequalities" as can be seen in Figure 1. In these pages of his book is synthesized the problem in study:

² "Yours "Revista" are also available in our Math Institute (Vol I and II), but could not be confirmed to whom they have been addressed, to the Institute, to Professor Kamke, or to the "German Mathematician Association (GMA)". I talked about this issue with Prof. Kamke, who handles these exchange affairs for the Institute. He is interested in exchange your "Revista" with the "Annual Report of the (GMA)" if he receives granted funds to do that. For the (very likely) case he succeeds in doing that, please write to us

1. indicating first of all the address to where send the "Annual Report", and
2. that the institution, in turn, indicate who is responsible for the regular posting of yours "Revista".

Both data are needed for the allocation of funds to make the exchange."

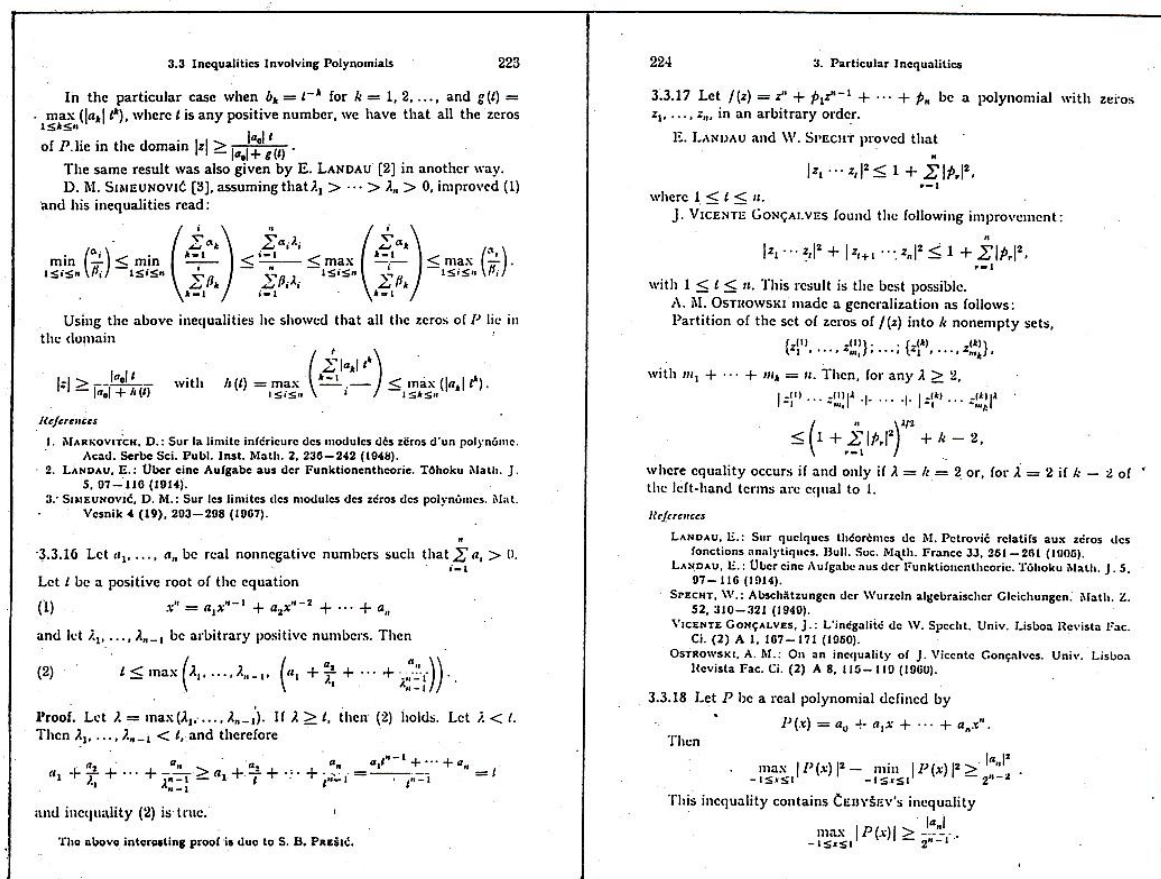


Figure 1 – Pages 223 and 224 of (Mitrinovic 1970)

We highlight the following extract from the text of Mitrinovic:

“J. Vicente Gonçalves found the following improvement: (...). This result is the best possible.” (1970, p 224)

However is the reaction of Alexander Ostrowski that we want to emphasize because it was held in RFCUL-A. This mathematician made excellent references to this work of J. Vicente Gonçalves in his paper “On an inequality of J. Vicente Gonçalves” published in volume VIII of RFCUL-A (1960). Ostrowski says that

“[in] 1950 J. Vicente Gonçalves (...) discovered the following improvement of the inequality (...)”

In his paper Ostrowski generalizes the inequality established by J. Vicente Gonçalves in 1950 and present a simpler proof of it.

4.2. J. Vicente Gonçalves and Oskar Perron

J. Vicente Gonçalves was the first to introduce in Portugal the topic “continued fractions”. He was influenced by Perron work on continued fractions “Die Lehre von den Kettenbrüchen”³ published in 1913.

A letter⁴ from Perron to J. Vicente Gonçalves, of 6 October 1954, made known by Costa & Malonek (2007), brought to light an exchange of mathematical knowledge

³ “Theory of Continued Fractions”

between these two mathematicians. This was reflected in several papers by J. Vicente Gonçalves published in RFCUL-A, as the following quote shows:

*“(...) (d’après une communication écrite de M. O. Perron)”*⁵

In his letter Perron begins by thanking the letter of J. Vicente Gonçalves, the offer of his book “Curso de Álgebra Superior” (and other papers) and sends his new edition of “Die Lehre von den Kettenbrüchen” of 1954. Perron makes some mathematical comments on the papers sent by J. Vicente Gonçalves. Although not made explicit reference in the letter, we are convinced that these papers are “Sur les fractions continues réelles” (1952) and “La continuité uniforme” (1953) both published in RFCUL-A. (Costa & Malonek 2007)

Perron does excellent comments to the work of J. Vicente Gonçalves and uses Gonçalves results in his own work. In his letter Perron also presents a new proof of a result using an inequality of Vicente Gonçalves.

Despite the fact that Perron not having published in the journal, many of his results are referred in it by other mathematicians, namely J. Vicente Gonçalves.

4.3. J. Vicente Gonçalves and Evelyn Frank (Costa 2001, p. 201)

“Modernas Investigações sobre Limites dos Módulos das Raízes” is the subject of the speech of J. Vicente Gonçalves in the opening session of the XXIII Portuguese-Spanish Congress to the Progress of Sciences (1^a Section) in 1956. The translation of this text was published later in volume VII of RFCUL-A (1958) with the title “Recherches Modernes sur les Limites des Racines des Polynomes”⁶.

Evelyn Frank was the reviewer of this paper in Zentralblatt n° 88. The following words are from her report about the referred paper:

“This is an expository article on the unified theory of research on bounds for the roots of polynomial equations. (...)

Next are given formulas for upper limits which were established in the twentieth century by Carmichael-Mason, Jensen, Birkhoff, Fujiwara, Kuniyeda, Berwald, Kojima, Gonçalves, Walsh, Anghelutza, Westerfield. In all these formulas only the absolute values of the coefficients appear. Next, formulas are given which the actual values of the coefficients are used. These were found by Williams, Gonçalves, Wall, E. Frank, Brauer, Parodi. Also there are given formulas for variable limits for certain ones of the roots. These were found by Landau, Fejer, Allerdice, Nagy, Markovitch, Montel, Vythoulskas, Van Vleck, Biernacki, Anghelutza, Gonçalves, Fujiwara, Hayashi, Egerváry, Carmichael-Mason, Specht.”

As Evelyn Frank explains, J. Vicente Gonçalves establishes formulas to the bounds for the roots of polynomial equations to the three kinds of research problems. Evelyn

⁴ Donated by the heirs of J. Vicente Gonçalves to Department of Mathematics of Faculty of Sciences of Coimbra University (Portugal).

⁵ “(according to a written communication from M. O. Perron)” in “Inégalités Intermittentes pour les Fraction Continues Arithmétiques, Revista da Faculdade de Ciências da Universidade de Lisboa, 2^a Série A, vol. VIII, 1:145-154 (1960).

⁶ “Modern research on the limits of Roots of Polynomials”

Frank had also relevant contributions to this research area. Maybe inspired for this scientific exchange, she published a paper about this subject in volume VIII of RFCUL-A (1960) with title “Calculation of the zeros of a polynomial”.

5. Final Remarks

We hope have contributed to show the importance of the initiative of J. Vicente Gonçalves by creating the RFCUL-A.

The letter of Knopp reveals interest in having access to this Portuguese scientific journal. What indicates the recognition of the scientific value of it and also shows the steps taken by Vicente Gonçalves in the dissemination his RFCUL-A.

The examples of exchange of mathematical knowledge show that RFCUL-A was, in fact, a space for scientific mathematical discussion with impact in the international mathematics community.

The fact that the papers published in the RFCUL-A were written mostly in French, English, Italian or German, well-known languages between the foreign mathematical community also contributed significantly to the divulgation of the scientific work of many Portuguese Mathematicians of the XX century (mainly between 1950 and 1974).

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