Social Sciences

A BRIEF ANALYSIS OF THE PUBLISHED BOOKS AND SCIENTIFIC ARTICLES ON FINSLER TOPIC

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ABSTRACT:
THE PRESENT ANALYSIS AIMS TO REVEAL THE DEVELOPMENT AND THE CURRENT STATUS OF THE PUBLICATION OF BOOKS AND ARTICLES ON FINSLER GEOMETRY TOPIC, IN REAL OR COMPLEX CASE. USING STATISTICAL METHODS, BOTH METHOD OF UNIVARIATE ANALYSIS AND DESCRIPTIVE METHOD OF MULTICRITERIAL ANALYSIS, IT COULD BE ESTABLISHED THE EVOLUTION OF THE PUBLICATION OF SCIETIFIC BOOKS AND ARTICLES ON FINSLER SUBJECT IN THE PAST YEARS AND IT COULD BE PROVIDED A FORECAST FOR THE NEXT TWO YEARS. ALSO, AN ANALYSIS OF THE INTERNATIONAL SPECIALIZED JOURNALS WAS DONE, CONSIDERING THE NUMBER OF ARTICLES PUBLISHED ON FINSLER GEOMETRY THEME OR THE SUBJECTS APPROACHED BY DIFFERENT RESEARCHERS AND RECEIVED FOR PUBLICATION.

KEY WORDS: FINSLER GEOMETRY, STATISTICS, EVOLUTION, UNIVARIATE ANALYSIS, MULTICRITERIAL ANALYSIS

INTRODUCTION

The basics of the Finsler geometry were made since 1918 by Paul Finsler in his doctoral thesis "On curves and surfaces in general spaces" ("*Über Kurven und Flächen in allgemeinen Räumen*"), but, partly because of the thought expressed in the foreword of his thesis, namely that a Finsler space is only a generalization of a Riemannian space, on the other part due to the geometrical principles undeveloped enough, Finsler geometry began to be studied by geometers only after 1970.

In the present, the study of Finsler spaces is of interest because it helps in solving theoretical problems existing in various fields, which might include several chapters of physics as mechanics, relativity, electromagnetism and signal processing theory, and the theory of biosystems, neuroimaging or neurology.

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In the present study will be analyzed the evolution of publishing of books and scientific articles on Finsler topic, in internationally recognized journals in ScienceDirect[2] database, between 2002-2012, trying at the same time to realize a forecast of publishing articles on the subject for the next two years, 2013-2014. Also, based on this information will be an analysis of existing specialized international journal in this database by the number of articles published on Finsler topic and the most common subjects and keywords approached in the published articles.

This statistical study is expected to reveal an increasing number of articles on Finsler theme published in recent years in more and more international journals, with diverse subjects and varied applications.

RESEARCH METHOD

The first step of this study involves setting the variables, collecting and recording data, followed by choosing the method of interpreting these data. For this purpose was consulted ScienceDirect website[1], where were extracted in a first stage the number of books and articles published in international journals on Finsler topic, during 2002-2012. These data were used to analyze the evolution of published articles and books on Finsler, achieving also an adjustment and a forecast of publication of materials on Finsler for years 2013-2014, using regression method and analysis of linear and parabolic trend[3].

The second stage of data collection and recording was done in order to analyze specialty magazines internationally recognized, in terms of the number of articles published on Finsler theme and the subjects approached, specific to this topic. Thus, accessing the ScienceDirect database[1] again, were registered the professional journals that published articles on Finsler and the number of articles published by each in the years 2010, 2011, 2012. Using descriptive technique Boxplot will first analyze the situation of publication in journals in 2012, followed by a comparative analysis in terms of the number of articles published by each of the main journals of interest during the years 2010, 2011, 2012. Through an advanced search in the same database, it could be recorded the number of articles published by major magazines on Finsler during 2012 on certain topics, thus enabling a descriptive study of individuals, in this case magazines, then, using the principal component factor analysis (PCA), a multivariate analysis and a classification of journals is

[2] http://www.sciencedirect.com
[3] Liliana Duguleană, *Statistică în cercetare*, Braşov: Transilvania University of Braşov, Doctoral School, 2012, Part I and Part II

performed[4]. In order to analyze the data collected and recorded in the first stage were used tools of Excel and SPSS software packages.

results

In this section will be presented and explained tables and graphs realized with the data collected and recorded in advance, required for the analysis presented above.

Analyses of trends of writing articles and books on Finsler geometry

In the graph in Fig.no.1 is observed the upward trend in publication of articles in internationally recognized magazines, from 21 items in 2002 to about 100 articles in 2012, according to ScienceDirect.

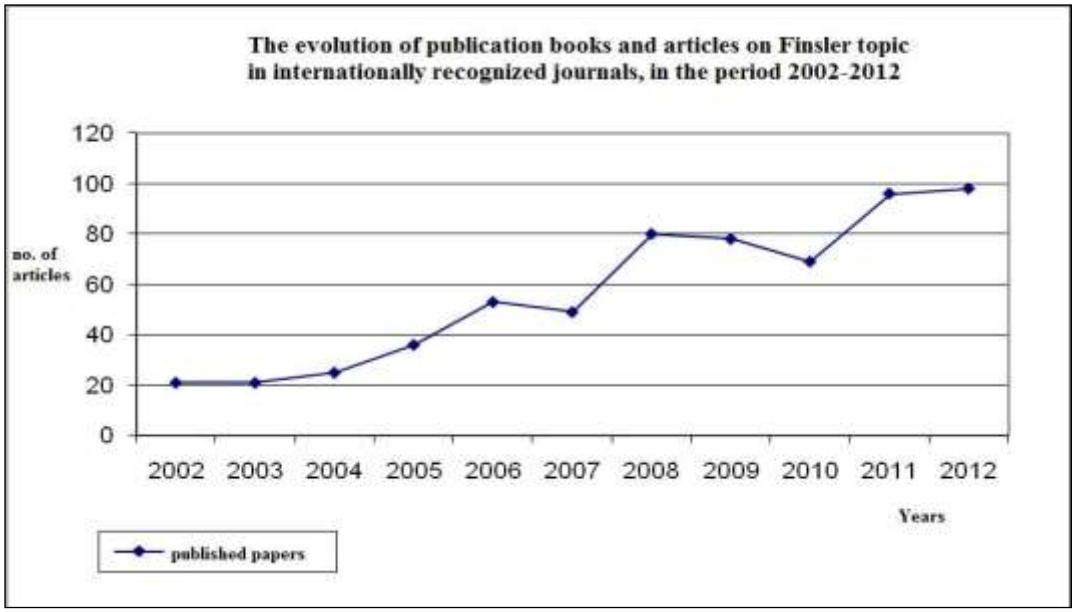

Fig.no.1 - Evolution of publication of books and articles on Finsler geometry, in the period 2002-2012

The situation is positive and reflects the interest of researchers from differential geometry for the geometry of Finsler spaces and their applications.

Next (Fig. no. 2) presents an adjustment and a forecast of publication of books and scientific articles in professional journals on Finsler topic for 2013-2014, based on data obtained for the period 2002-2012, according to ScienceDirect.

[4] http://www.scribd.com/doc/52127887/Proiect-Analiza-Datelor

Theoretical round values calculated with the linear model $\hat{y}_i = 57 + 8t_i$ shows that each year there is an average annual increase of publication of books or articles by 8 publications, forecasting 108 materials published in 2013, respectively 116 materials in 2014.

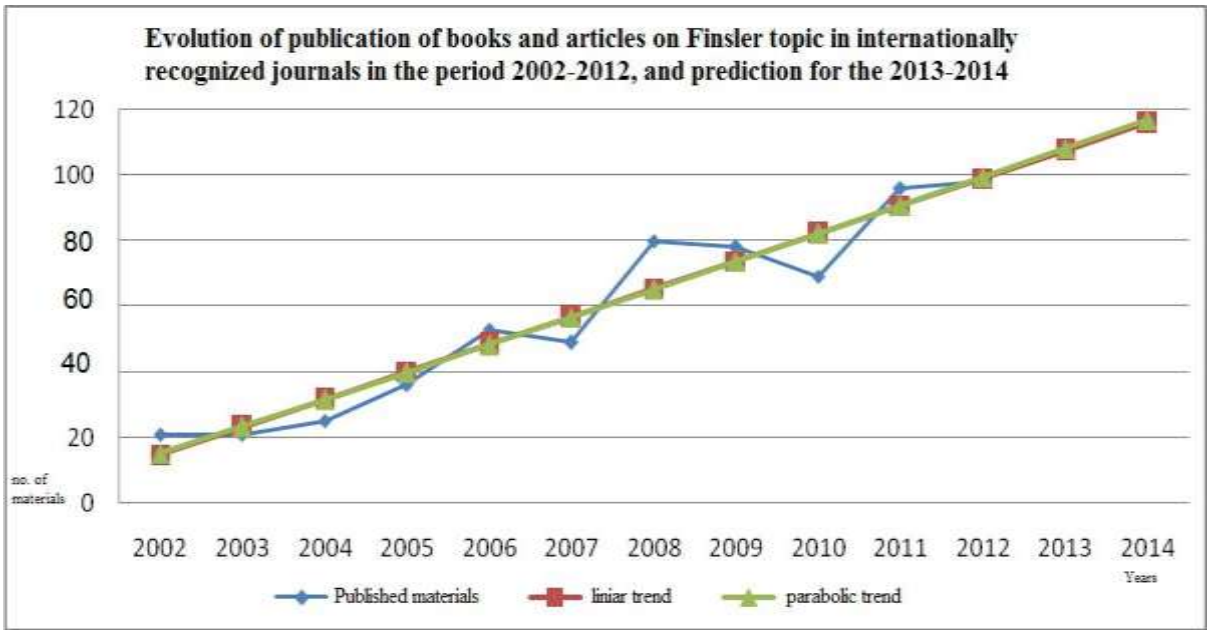

Fig. no. 2 – Evolution of publication of materials on Finsler topic in the period 2002-2012 and prediction for 2013-2014

The parabolic model describes approximately the same optimistic trend of the development of publication (108 of published materials in 2013, 117 in 2014 respectively), relative to the parabolic model: $\hat{y}_i = 56{,}65 + 8{,}44t_i + 0{,}03t_i^2$, since according to application of the Regression tool of the Data Analysis package, Excel obtains the following values:

Table no. 1 - The parameters of the regression equation, corresponding to parabolic trend

	Coefficients
Intercept	56,65268065
X Variable 1	8,436363636
X Variable 2	0,025641026

The almost zero value of the parameter of the square element from the parabolic regression equation and the values of others parameters close to the parameters of the linear regression equation indicate the overlap of the two trends. However, by calculating the sum of the squares of the residues in both models is noted that the parabolic model adjusts better the trend of the values observed, its value being approximately 50 percentile less than in the linear case.

The univariate analysis of the internationally recognized magazines, by the number of he published articles

In this subsection, will be analyzed the internationally recognized magazines (about 40, according to the data) depending on the number of the published articles on Finsler theme during 2010, 2011 and 2012. First will be analyzed journals that published professional articles on the above theme in 2012, followed by a comparative analysis to the number of articles published by a magazine in the three years.

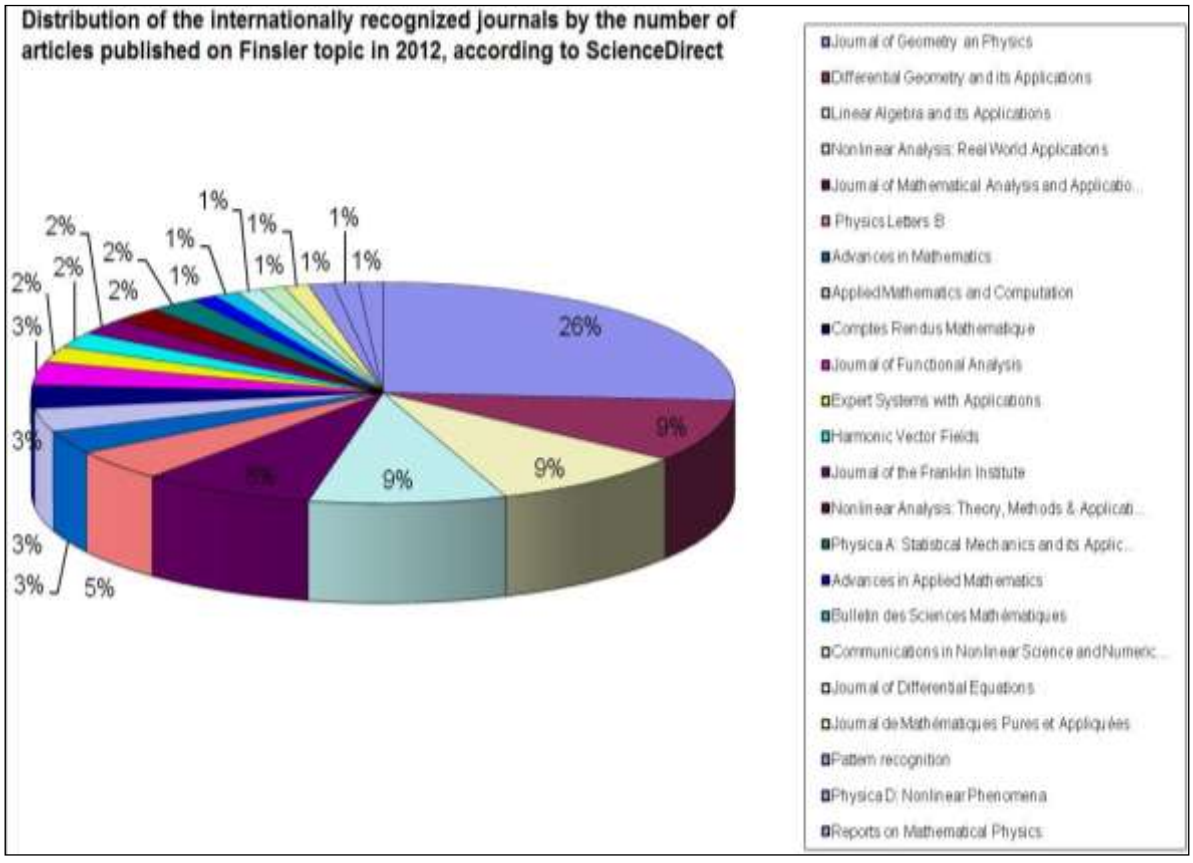

Fig. no. 3 - Distribution of journals by the number of articles published on Finsler in 2012

Looking at the number of the published articles on Finsler topic in 2012, is firstly performed an analysis of the structure of specialty magazines and thus it is obtained the circular graph (Fig. no. 3), which shows that the majority of the articles on Finsler topic, 26%, were published in the "*Journal of Geometry and Physics*".

Further, using the descriptive data analysis technique Boxplot to analyze the distribution of the number of articles on Finsler topic published in a journal in 2012, we get Fig. no. 5. It is observed the aberrant point represented by "*Journal of Geometry and Physics*" with 23 articles published in 2012, which is exceeding the limit of 7,25.

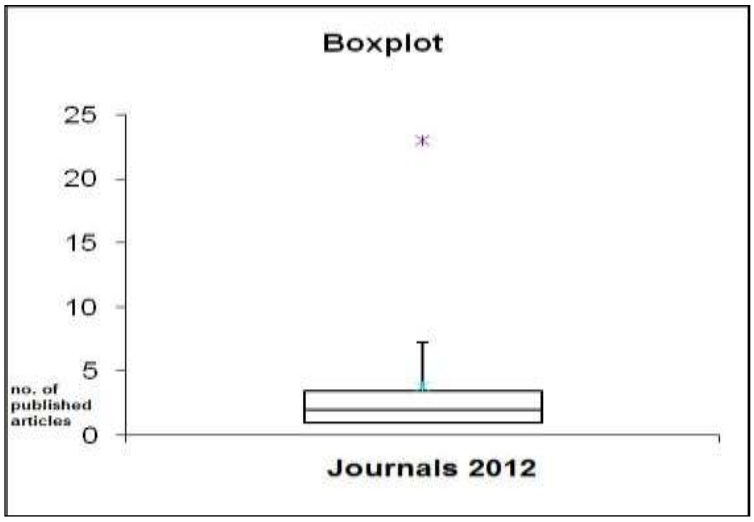

Fig. no. 4 - Boxplot for the distribution of the number of articles on Finsler geometry published in a journal in 2012

The outdoor bar is marked on the y-axis at the maximum value of eight articles published by the journals "*Differential Geometry and Its Applications*", "*Linear Algebra and Its Applications*", "*Nonlinear Analysis: Real World Applications*", and the minimum coincides with quartile 1, i.e. one article published. The average is approximately of 4 items, and is shown at the top of the box, which is greater than the median of 2.

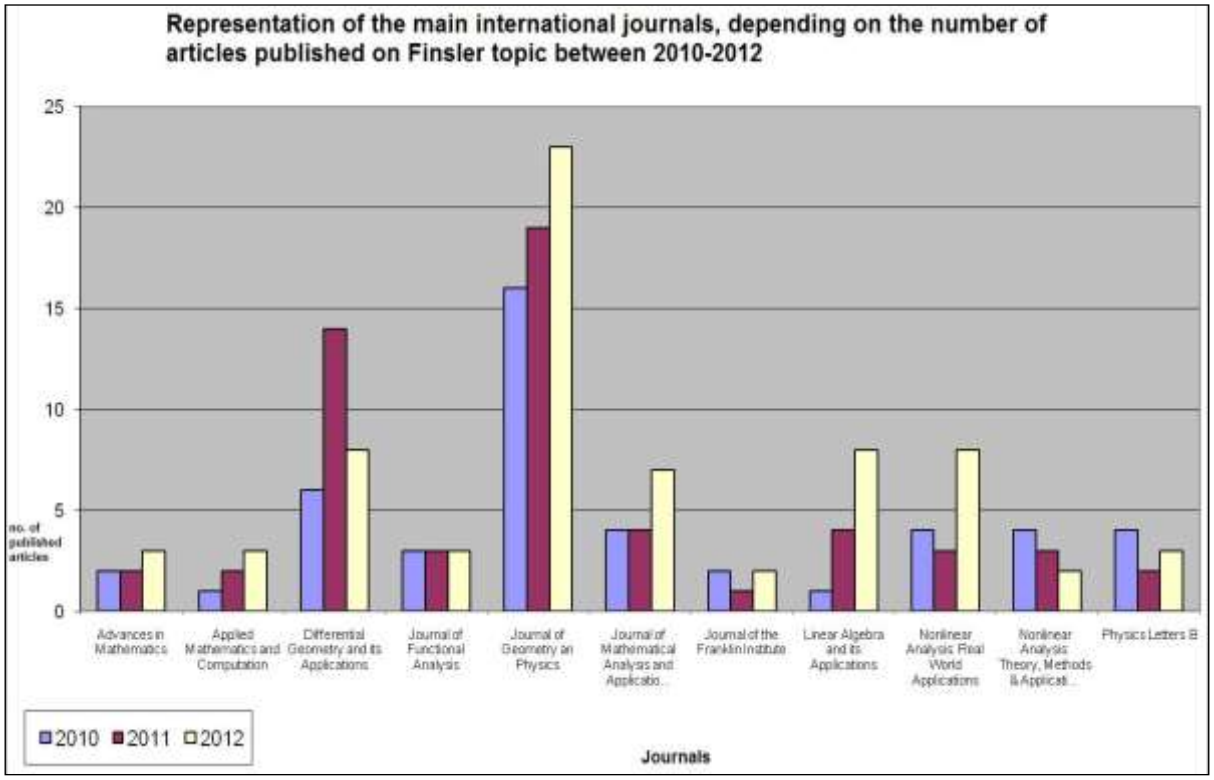

Fig. no. 5 - Evolution of the main BDI / ISI journals by the number of articles published on Finsler topic

If it is considered for each year the Boxplot graph of distribution of the number of articles on Finsler topic published in major journals, according to Fig. no. 5, and compares them, as in the Fig. no. 6, is observed that every year there is at least one aberrant point, represented by the journal, "*Journal of Geometry and Physics*", with even a second aberrant point in 2011, represented by "*Differential Geometry and Its Applications*".

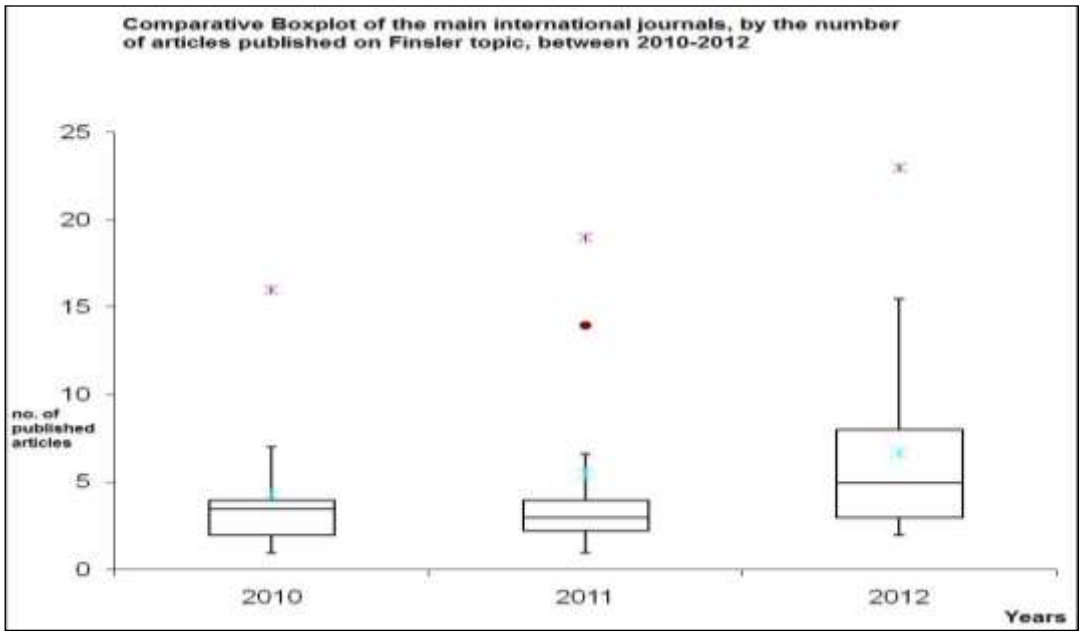

Fig. no. 6 - Adjacent Boxplots for the number of Finsler articles published in a journal

For most magazines is observed an increasing trend of publishing articles on the Finsler topic the last three years. In each year, the average number of articles has an upward trend from 4 to about 7 articles, as well as the median increases from 3 to 5 items. However, the average remains higher than the median.

The multivariate analysis of internationally recognized magazines according to the topics approached on Finsler theme

In this subsection will be analyzed the main journals which published articles on Finsler topic, depending on subjects dealt on this topic and the number of articles written for each subject, according to the Table no. 2.

Table no. 2 - Correlation journal - number of articles written on the subject (ScienceDirect)

Subjects / Journal	Finsler metric	Finsler space	complex Finsler	Finsler manifold	special metrics
Advances in Mathematics	1	1	0	0	1
Applied Mathematics and Computation	1	0	0	1	1
Comptes Rendus Mathematique	1	1	0	1	1
Differential Geometry and its	2	2	1	1	2
Journal of Functional Analysis	0	1	0	1	1
Journal of Geometry an Physics	5	3	2	2	3
Journal of Mathematical Analysis and	0	4	1	2	1
Linear Algebra and its Applications	1	1	0	1	2
Nonlinear Analysis: Real World	3	1	1	1	2
Physics Letters B	1	1	0	1	3

First will be a descriptive study of individuals, in this case the considered journals, by the preponderance of publishing articles with a particular subject, and so, resulting the star graphs from Fig. no. 7. Every journal will be represented by a pentagon, each angle of it representing a subject and the distance from the angle to the origin is proportional to the deviation variable values towards minimum. For example we can see that the journal "*Advances in Mathematics*" has not published articles Finsler theme on the subject Finsler manifold and complex Finsler spaces, while magazines "*Differential Geometry and Its Applications*", "*Journal of Geometry and Physics*" and "*Nonlinear Analysis : real World Applications*" published articles on Finsler topic from all the investigated subjects.

In the following, will make a principal components analyze for the journals considered in Table no. 2. For this will use the SPSS software package. Within this shall be considered as observed indicators the above subjects used for the search, i.e.: Finsler metric (metr.f), Finsler space (sp.fin), complex Finsler space (f.compl), Finsler manifold (variet. f), special metrics (metr.sp).

Applying principal component analysis (PCA) based on the correlation chart (Fig. no. 8) two main components are being established, by grouping the five original variables. Thus, the first component gathers effects of the next characteristics: Finsler spaces, Finsler

manifolds and, in a weaker measure, complex Finsler space. This first component could define "the geometry of Finsler spaces". The second component includes only the feature of Finsler metric and special metrics, and could define "metrics on Finsler spaces".

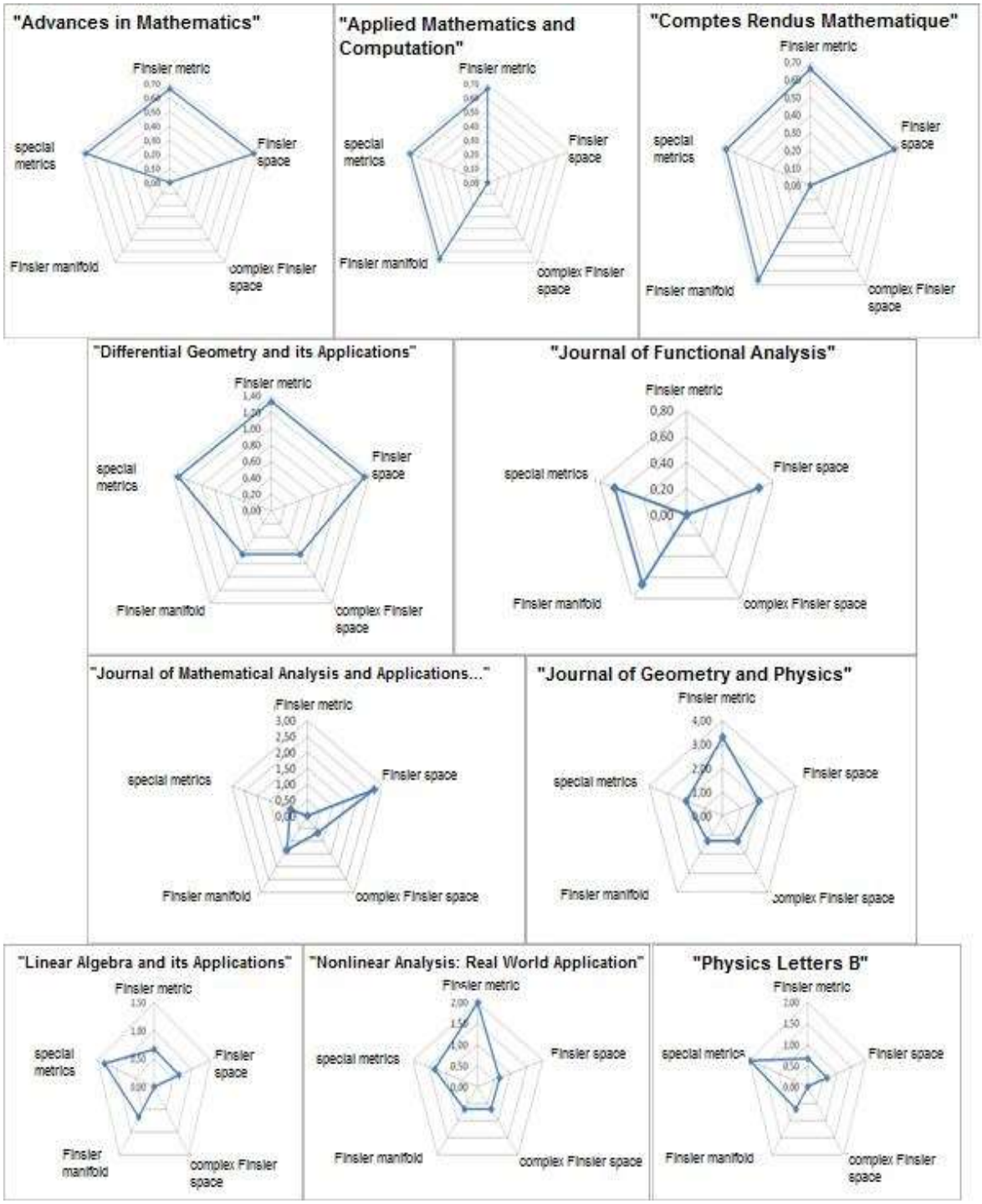

Fig. no. 7 – The star graphics for the considered journals

The interpretation of the individuals graph (Fig. no. 9) leads to a picture of the position of the analyzed journals according to the two components identified in the analyzed variables. Depending on the position of magazines, there are two major journals:

"*Journal of Mathematical Analysis and Applications*", "*Journal of Geometry and Physics*", clearly separated from the rest of the magazines, which form a distinct group, as shown in the chart. An individual will be more representative of a component as the angle between the individual and its projection is smaller. Compared to component 2, "*Journal of Mathematical Analysis and Applications*" stands at over 2 deviations and towards component 1, "*Journal of Geometry and Physics*" is over 2 deviations, the group of the other magazines focusing on a medium level of the two components.

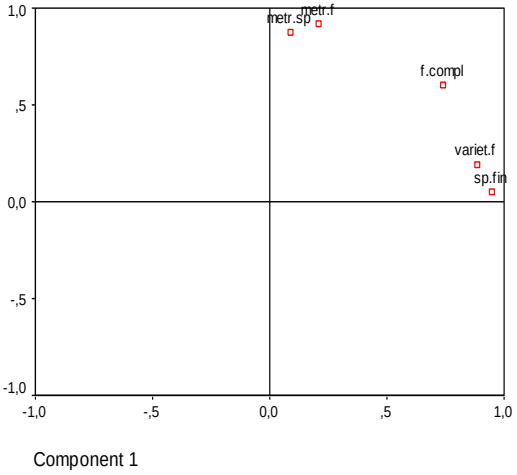

Fig. no. 8 - The graph of correlations

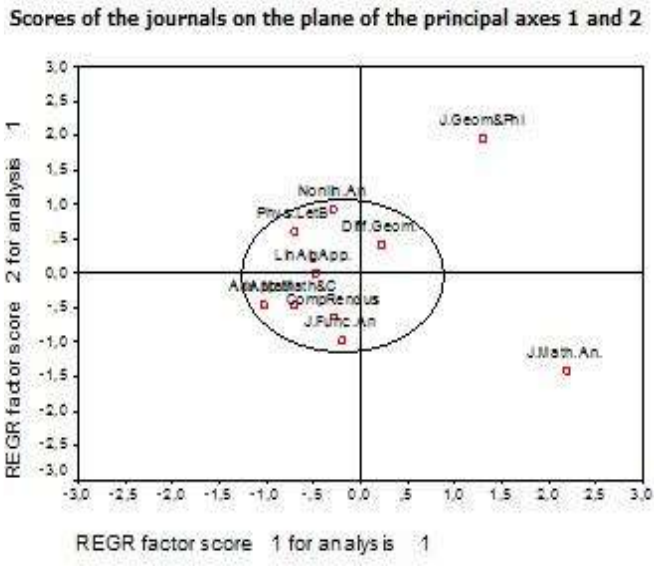

Fig. no. 9 - The graph of individuals

Thus, "*Journal of Mathematical Analysis and Applications*" is the best magazine for publishing articles with topics about metrics on Finsler space, and "*Journal of Geometry and Physics*" is the best magazine for publishing articles about geometry of Finsler space.

CONCLUSION

The statistical analyzes performed above show that the publication of articles on the Finsler topic has an upward trend; the forecast for the years 2013-2014 is still upward, revealing the growing interest in the study of geometry of Finsler spaces and their applications.

Most specialty journals publish an average of 7 articles on Finsler geometry per year according to data from 2012. There are exceptions, such as "*Journal of Geometry and Physics*" which publishes about 20 articles on the Finsler topic per year.

The published articles approach various topics about Finsler spaces, however, using the PCA analysis stands out "*Journal of Mathematical Analysis and Applications*" as the best magazine for publishing articles that treats matters of metrics of Finsler spaces and "*Journal of geometry and Physics*" as the best magazine for publishing articles that deal with topics on geometry of Finsler space.

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