

# Research Trends in Indian Journal of Pure and Applied Physics (IJPAP) for the Year 2009 - 2012

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**Abstract** – The present study aims to explore research trends in Indian Journal of Pure and Applied Physics (IJPAP). The study has been conducted with 546 contributions published in the journal selected four years for a period between January, 2009 and December 2012. In this research paper, an attempt is made to analyze and discuss the each article, year wise distribution of contributions and number of authorship, volume wise authorship, author's productivity and the single and multi-authored papers of the journal. The findings of the results revealed that the maximum number of contributions i.e., 149 (27.29 %) were published in the year 2012 whereas the minimum number of 121 (22.17 %) was published in the year 2011. The highest number of author productivity i.e., 420 (6.56) were published in the year 2010. The degree of collaboration ranges from 0.90 to 0.92 and the average degree of collaboration is 0.915. The average length of the articles varied from a minimum of 6.31 pages in the year 2012 to a maximum of 7.08 pages in the year 2011.

**Keywords:** Scientometrics; Bibliometrics; Authorship Pattern; Degree of Collaboration; Indian Journal; Publication Analysis; IJPAP; NISCAIR; India.

## I. INTRODUCTION

Indian Journal of Pure and Applied Physics (IJPAP) started in 1963 and the frequency is monthly, National institute of science communication & information resources (NISCAIR), New Delhi. For the present research study, Indian journal of pure and applied physics (IJPAP) was selected as the source journal for selected four years between 2009 and 2012. The Journal covers the broad subject heading are Classical Mechanics, Fluid Mechanics, Pneumalives (Gas mechanics), Sound and related vibrations, Lights and

related radiation, Heat, Electricity & electronics, Magnetism and Modern physics.

## II. OBJECTIVES OF THE STUDY

The present research study aims to evaluate the publication trends of *Indian Journal of Pure and Applied Physics (IJPAP)* from 2009 to 2012 with the application of bibliometric indicators. The main objectives of the study are as follows:

1. To analyze the articles published in IJPAP during the period;
2. To examine the authorship pattern for a period of study;
3. To discover the year wise contributions of articles;
4. To study the period and volume wise authorship pattern;
5. To examine the author's productivity;
6. To observe the single and multi-authored papers of the journal and
7. To realize the Degree of collaboration.

## III. PREVIOUS STUDIES

Kademani B S, et al. (2006) has conducted a scientometric study on Thorium research in India with a sample of 2399 papers published during the period between 1970 and 2004 and the results showed that the authorship trend was towards multi authored papers as 85.7% of the papers were multi authored. Rajendran P, Jeyashankar P and Elango B (2011) have observed and carried out the research articles published in Journal of Scientific and Industrial Research from the year 2005 to 2009. It was found that out of 633 contributions only 51 are single authored and rest by multi authored with

degree of collaboration 0.92 and week collaboration among the authors. Pattern of Co-Authorship revealed that the improving trend of co-authored papers. The study revealed that the author productivity is 0.34. Jancy, S; Hariharan, R & Subramanian, N (2013) have studied on Indian Journal of pure and applied physics. A list of articles on various aspects of contribution of research articles published during 2008-2012 was taken for this study. The study covered 690 articles in five volumes 46 2008 to volumes 50 2012 were identified in the Indian Journal of Pure and Applied Physics. The five-yearly distribution of Indian journal of pure and applied physics carried out to observe the number of contributions and their distribution in different volumes, authorship pattern, and special issues published during the study. Sanni S A and Zainab A N (2010) have analyzed the contributions published in Medical Journal of Malaysia during 2004 – 2008 and the results were found 4.82% (28) of contributions were published by Malaysian authors with foreign collaboration. Papadimitriou, F & Kidman, G (2012) have analyzed the developments and changes in geographical and environmental education as reflected in the journal IRGEE, after performing statistical and scientometric analyses on the basis of the content analysis of IRGEE for the period 1992-2009. Gupta, B M (2012) has analyzed the research output on Pakistan in the field of science and technology during the period between 2001 and 2010 on various aspects its growth and share in the world's research output, pattern of research communication in core domestic and international journals. The results revealed that Pakistan needs to increase its output and bring about improvement in the quality of its research efforts. Huang, M.H., & Yang, H.W. (2013) have explored the papers and patents in the field of fuel cell to examine the scientific and technical development in the area. The data were retrieved from the WOS database and USPTO patent data from the period between 1991 and 2010, which consists of 20,758 papers and 8,112 patents. The results indicated upward growth in both papers and patents in fuel cell, with a higher growth rate for papers. The study showed that major paper and patent output are concentrated in a small number of countries. An imbalance exists between the number of papers published and the patents granted in organizations. Velmurugan, C. (2013), explored that from the study of the publication of papers in Annals of Library and Information

Studies. The analysis conducted with 203 contributions published in the journal for a period of selected six years i.e. 2007 – 2012. It was observed from the study that the highest number of contributions i.e., 43 (21.19%) were published in the year 2010. Most of the contributions are found by double authored i.e., 88 (43.35 %). The degree of collaboration (i.e.131 out of 203) was high in terms of authorship pattern was 0.64. Lipetz, B. (1999) has observed the author productivity of JASIS over the five decades from 1950 to 1999 through reviewing one volume out of each decade: 1955, 1965, 1975, 1985, and 1995. The findings revealed that the percentage of authors with more than one article exceeded 20% in 1995, while a different pattern of authors with more than one article began in 1995 with a ratio of 2% and it had increased in each decade since, to more than 9% in 1995.

In this research paper, an attempt has been made to analyze the contributions to *Indian Journal of Pure and Applied Physics (IJPAP)* published during the year 2009 – 2012, in order to explore the authorship pattern, collaborative research, keywords and citation of the papers among the contributions.

#### IV. METHODOLOGY AND LIMITATION

The required data collected from the official website of Indian Journal of Pure and Applied Physics (IJPAP). Five hundred and forty six articles of four volumes by selected four years between 2009 and 2012 for this present study. The details regarding each published article such as title of the article, number of authors, their institutional affiliations and addresses, number of references with list, page number, number of tables and figures etc., were recorded and analyzed for making observations. This study is also limited to research papers published in IJPAP between January 1<sup>st</sup> 2009 and December 31<sup>st</sup>, 2012, covers only 546 articles of 48 issues published.

#### V. DATA ANALYSIS AND RESULTS

The collected data was made to analyze the year-wise distributions of articles have been arranged in which the maximum number of contributions i.e., 149 (27.29 %) were published in the year 2012 whereas the minimum number of 121 (22.17 %) was published in the year 2011. (Table.1)

TABLE I DISTRIBUTION OF PUBLICATIONS BY YEAR WISE

Year	No of articles	%age
2009	136	24.90
2010	140	25.64
2011	121	22.17
2012	149	27.29
Grand Total	546	100

Table II indicates that the total of 546 contributions was published with an average 136.5 articles per year average. The highest number 149 (27.29 %) of contribution by the 2012 and the lowest number 121 (22.16 %) of articles were published in the year is 2011.

The table III depicts that the details about the authorship pattern of articles published during the study. Out of total of 546 articles, the maximum number of contributions i.e. 154 (28.21 %) have been contributed by Double authors and followed by 148 contributions (27.10 %) and 78 contributions (14.29 %) and the minimum number of contributions i.e. 46 (8.42 %) by single author only.

TABLE II DISTRIBUTION OF PUBLICATIONS BY YEAR / MONTH / VOLUME WISE

Month wise	Year / Volume wise				Total
	2009/47	2010/48	2011/49	2012/50	
January	11	10	11	10	42
February	11	11	10	10	42
March	10	9	11	8	38
April	11	11	10	10	42
May	12	10	11	11	44
June	19	11	12	9	51
July	11	19	9	27	66
August	11	11	10	8	40
September	10	12	9	8	39
October	10	9	10	8	37
November	10	17	9	32	68
December	10	10	9	8	37
Grand Total	136	140	121	149	546
%age	24.90	25.65	22.16	27.29	100

TABLE III AUTHORSHIP PATTERN OF PAPERS PUBLISHED BY YEAR AND VOLUME

Authors	Year				Total	%age
	2009	2010	2011	2012		
Single Author	10	11	12	13	46	8.42
Two Authors	50	31	34	39	154	28.21
Three Authors	30	39	42	37	148	27.10
Four Authors	15	24	17	22	78	14.29
Five Authors	18	19	8	15	60	10.99
More than five	13	16	8	23	60	10.99
Grand Total	136	140	121	149	546	100

TABLE IV PROBLEMS FACED BY INDIAN TOURISTS

Authorship	No of Publications	Cumulative contributions	%age
Single Author	46	46	2.56
Two Authors	154	308	17.12
Three Authors	148	444	24.69
Four Authors	78	312	17.34
Five Authors	60	300	16.67
More than five	60	389	21.62
Grand Total	546	1799	100

The above data represents the detail about the authorship pattern with cumulative contributions in which table no. 4 indicates that out of the total of 546 articles, the majority of 444 (24.69 %) appeared as three authors and followed

by 389 (21.62 %) as more than five authors; 308 (17.12 %) as two authors and only 46 (2.56 %) have published the articles by single author.

TABLE V AUTHORSHIP PATTERN OF SINGLE VS MULTIPLE CONTRIBUTIONS

Authors	Years wise				No of Articles	%age
	2009	2010	2011	2012		
Single	10	11	12	13	46	8.42
Multiple	126	129	109	136	500	91.58
Grand Total	136	140	121	149	546	100

The Table V identifies the details about the data that out of 546 articles single author contributed only 46 (8.42 %) articles while the rest 500 (91.58 %) articles were contributed by joint authors. It showed that the majority of the articles have been contributed only by multiple authors

Table VI indicates that the data related to author productivity, which shows that the total average number of authors per paper is 3.60 and the average productivity per author is 0.27. The highest number of author productivity i.e., 420 (6.56) were published in the year 2010.

TABLE VI AUTHOR PRODUCTIVITY

Years	Total No of Articles	No of Authors	AAPP*	Productivity per year
2007	87	12	0.13	7.25
2008	85	212	2.49	0.40
2009	67	360	5.37	0.18
2010	64	420	6.56	0.15
2011	68	305	4.48	0.22
2012	77	305	3.96	0.25
Total	448	1614	3.60	0.27

\*Average Authors per Paper (AAPP) = Number of authors/ Number of papers.  
Productivity per author= Number of papers/ Number of authors.

TABLE VII DEGREE OF COLLABORATION

Year	Volume	No of Authors		Total	Degree of Collaboration
		Single	Multiple		
2009	47	10	126	136	0.92
2010	48	11	129	140	0.92
2011	49	12	109	121	0.90
2012	50	13	136	149	0.91
Total		46	500	546	0.915
Percentage %		8.42	91.58	100	

Table VII, The degree of collaboration ranges from 0.90 to 0.92 and the average degree of collaboration is 0.915. The degree of collaboration is calculated by using the following formula (K. Subramanyam, 1982):

The formula is Where

$$C = \frac{N_m}{N_m + N_s}$$

C= Degree of Collaboration

Nm = Number of multiple authors

Ns = Number of single authors

$$C = \frac{500}{500 + 46 = 546}$$

In the present study the value of C is **C = 0.915**

As a result, it was found that the degree of collaboration in the journal Indian Journal of Pure and Applied Physics is 0.915.

Table VIII reveals the average papers per volumes per contribution.

$$\text{Average pages per volumes} = 3599/4 = 899.75$$

$$\text{Average pages per issues} = 3599/48 = 74.97$$

$$\text{Average pages per contribution} = 3599/546 = 6.59$$

TABLE VIII PAGE DISTRIBUTION

Year	Vol. No	Total pages	No of contributions	Average
2009	47	889	136	6.54
2010	48	913	140	6.52
2011	49	857	121	7.08
2012	50	940	149	6.31
Total		3599	546	6.59

The above table depicts that 546 articles published with a total page of 3599 (average 6.59 pages per article) during the year 2009 -2012. It is observed that the average length of the articles varied from a minimum of 6.31 pages in the year 2012 to a maximum of 7.08 pages in the year 2011.

## VI. FINDINGS

The analysis revealed the following major findings

1. The maximum number of contributions i.e., 149 (27.29 %) were published in the year 2012 whereas the minimum number of 121 (22.17 %) was published in the year 2011.
2. Out of total of 546 articles, the maximum number of contributions i.e. 154 (28.21 %) have been contributed by Double authors and the minimum number of contributions i.e. 46 (8.42 %) by single author only.
3. The majority of 444 (24.69 %) appeared as three authors and followed by 389 (21.62 %) as more than five authors; 308 (17.12 %) as two authors and only 46 (2.56 %) have published the articles by single author as per authorship pattern with cumulative contributions.
4. Out of 546 articles single author contributed only 46 (8.42 %) articles while the rest 500 (91.58 %) articles were contributed by joint authors. It showed that the majority of the articles have been contributed only by multiple authors.
5. The highest number of author productivity i.e., 420 (6.56) were published in the year 2010.
6. The degree of collaboration ranges from 0.90 to 0.92 and the average degree of collaboration is 0.915.
7. The average length of the articles varied from a minimum of 6.31 pages in the year 2012 to a maximum of 7.08 pages in the year 2011.

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