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The Statistical Analysis of the Influence of Chinese Mathematical Journals Cited by Journal Citation Reports

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Abstract

According to journal citation report published by ISI, the article systematically analyses the basic indexes of eight Chinese mathematical journals, including the impact factor, article, total cites, immediacy index, eigenfactor score and article influence score. Then compares them with the indexes of the top 8 mathematical journals from JCR to find the gap and the way of improving.

Key words: Mathematical journal; JCR; Quantitative index; Statistical analysis

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INTRODUCTION

As we all know "Science and technology are primary productive force", science and technology act as a very important reason for the fast developing economy. And the global influence of science and technology journals can reflect a country's scientific and technological strength and level well. So we should endeavor to improve the quality of our science and technology journals and enhance their global influence, promote the development of science and technology in our country from the side.

This article compares the basic indexes of eight Chinese mathematical journals and the top 8 mathematical journals based on JCR to make a quantitative analysis and objective evaluation on the influence of Chinese mathematical journals and provide the basis for further improvement.

1. DATA COLLECTION

Journal Citation Reports published by the institute for scientific information is known as the most authoritative journal evaluation system. Open web of science, enter JCR database, set the time to 2013, search by country/territory, select Peoples R China, then we can get the data of 162 Chinese journals. Back to start, search by mathematics, then we can get the data of 302 mathematical journals. After comparing, we can get the data of Chinese mathematical journals cited by JCR in 2013. And we can also get the data of the top 8 mathematical journals.

2. STATISTICAL ANALYSIS

2.1 Comprehensive Description of Basic Statistics

Table 1 shows the basic indexes of eight Chinese mathematical journals and the top 8 mathematical journals, including the impact factor, article, total cites, immediacy index, eigenfactor score and article influence score. And it also shows the average of the basic indexes of all the 302 mathematical journals after a simple calculation. The indexes of the top 8 mathematical journals represent the international advanced level and the average of the indexes of all the 302 mathematical journals represent international average.

After comparing, we can find among the indexes of our journals only article is above the international average while the rest indexes are below the international average, which means there is a bigger gap between the indexes of our journals and the top 8 mathematical journals. As to influence, one of the indexes, the influence of the top 8 mathematical journals is eight times of ours and when it comes to average cites, it's fifteen times.

We can see our journals contain a large number of articles, but the quality and international influence of the articles are not high enough which still need to be improved.

Table 1
The Data of 8 Chinese Mathematical Journals and the Top 8 Mathematical Journals and the Average of All the 302 Mathematical Journals

Title	Rank (by IF)	Total Cites	IF	5-year IF	Immediacy Index	Articles	Eigenfactor Score	Article Influence Score	Average Cites	Self-cited Rate
J COMPUT MATH	41	815	1.049	1.345	0.056	36	0.00348	0.912	22.64	3.31
NUMER MATH-THEORY ME	79	119	0.767	0.837	0.182	33	0.00128	0.568	3.61	3.36
SCI CHINA MATH	89	475	0.71	0.686	0.107	196	0.00598	0.553	2.42	15.16
ACTA MATH SCI	136	593	0.62	0.509	0.056	144	0.00314	0.235	4.12	10.96
FRONT MATH CHINA	205	204	0.452	0.555	0.265	83	0.002	0.427	2.46	10.29
ACTA MATH SIN	225	1297	0.419	0.505	0.082	184	0.00494	0.318	7.05	5.71
CHINESE ANN MATH B	265	405	0.316	0.528	0.055	55	0.00251	0.497	7.36	3.46
ALGEBR COLLOQ	275	300	0.272	0.28	0.06	67	0.00128	0.194	4.48	10
Average		526	0.5756	0.656	0.1079	99.75	0.003076	0.463	6.77	7.78125
COMMUN PUR APPL MATH	1	6904	3.08	3.373	0.708	48	0.01627	4.283	143.83	1.26
J AM MATH SOC	2	2398	3.061	3.713	0.655	29	0.01966	6.781	82.69	0.5
ACTA MATH-DJURSHOLM	3	3096	3.033	4.185	0.765	17	0.00811	7.489	182.12	0.45
ANN MATH	4	8926	2.822	3.478	0.816	49	0.03753	6.155	182.16	0.91
FIXED POINT THEORY A	5	2320	2.486	2.453	0.886	315	0.00503	0.42	7.37	3.84
FOUND COMPUT MATH	6	706	2.152	3.423	0.516	31	0.00717	3.5	22.77	3.54
INVENT MATH	7	7060	2.123	2.783	0.6	60	0.02698	5.326	117.67	2.03
MEM AM MATH SOC	8	2069	1.782	2.44	0.296	27	0.00831	3.538	76.67	0.77
Average(1-8)		4184.88	2.567	3.231	0.6553	72	0.01613	4.687	101.91	1.6625
Average(1-302)		1168.45	0.674	0.795	0.162	83.4482	0.0051	0.95	14	

2.2 Influence Factor Analysis

From the combination of Table 1 and Table 2 we can see, the impact factor of our journals is not very high, the average is just 0.5756 which can not reach the international average 0.6744. The highest rank of our journals is 41. The average of the top 8 mathematical journals is 2.5674, about five times of ours. Thus it can be seen that the general level of impact factor of eight Chinese mathematical journals is not high, there is still a big gap with the international leading journals. Also reflect the quality of the articles published in our journals is not good enough from the side.

Table 2
The Rank of Eight Chinese Mathematical Journals in 2013 JCR

Range of IF	Rank	Number of articles	Journal and rank	
3.08≥IF≥2	1--7	7		
2>IF≥1	8--45	38	J COMPUT MATH(41)	
1>IF≥0.9	46--59	14		
0.9>IF≥0.8	60--73	14		
0.8>IF≥0.7	74--96	23	NUMER MATH-THEORY ME(79)	SCI CHINA MATH(89)
0.6>IF≥0.5	97--143	47	ACTA MATH SCI(136)	
0.5>IF≥0.4	144--186	43		
0.4>IF≥0.3	187--271	38	FRONT MATH CHINA(205)	ACTA MATH SIN(225)
0.3>IF≥0.2	272-293	22	ALGEBR COLLOQ(275)	
0.2>IF≥0	294--302	9		

2.3 Self-Cited Rate Analysis

Self-cited rate is the radio of total self-cited and total cites. It's a measurement index of the journal's self citation. From table 3 we can see, in 2013 SCI CHINA MATH has the highest self-cited rate of the eight Chinese mathematical journals, and the self-cited rate of J COMPUT MATH is the lowest. The average of self-cited rate is 7.78125%. And the self-cited rate of FIXED POINT THEORY A is the highest of the top 8 mathematical journals, the lowest is ACTA MATH-DJURSHOLM, the average is 1.6625%.

Table 3
Self-Cited Data of Eight Chinese Mathematical Journals and the Top 8 Mathematical Journals

Journals	Total cites	Self-cited	Self-cited rate(%)
J COMPUT MATH	815	27	3.31
NUMER MATH-THEORY ME	119	4	3.36
SCI CHINA MATH	475	72	15.16
ACTA MATH SCI	593	65	10.96
FRONT MATH CHINA	204	21	10.29
ACTA MATH SIN	1297	74	5.71
CHINESE ANN MATH B	405	14	3.46
ALGEBR COLLOQ	300	30	10
AVERAGE	526	38.375	7.78125
COMMUN PUR APPL MATH	6904	87	1.26
J AM MATH SOC	2392	12	0.5
ACTA MATH-DJURSHOLM	3096	14	0.45
ANN MATH	8926	81	0.91
FIXED POINT THEORY A	2320	891	3.84
FOUND COMPUT MATH	706	25	3.54
INVENT MATH	7060	143	2.03
MEM AM MATH SOC	2069	16	0.77
Average	4184.125	158.625	1.6625

2.4 Total Cites and Average Cited Per Paper Analysis

Total cites is a general concept, it refers to the total number of the papers published on the journal from founding year to assessment year. From table 1 we can see that the mean of total cites of the eight Chinese mathematical journals is 526. The mean of total cites of 302 mathematical journals is 1168.447, about two times of ours. And the mean of total cites of the 8 top mathematical journals is 4184.875, bout eight times of ours. The gap is bigger in average cited per paper. The mean of average cited per paper of the eight Chinese mathematical journals is 6.67, the international average is 14 and the international advanced level is 101.91. The big gap tells us the low international influence of our journals, but it also shows we have more room for improvement.

2.5 Average Citing Rate Per Paper, Citing Journals and Cited Journals

Average citing rate per paper is the average number of references cited by each paper in a certain time. It's a radio of citing reference number and articles. From Table 4 we can know the average citing rate per paper of NUMER MATH-THEORY ME is the highest of eight Chinese mathematical journals and that of ALGEBR COLLOQ is the lowest. The average is 21.95. As same as the top 8 mathematical journals MEM AM MATH SOC has the highest number and FIXED POINT THEORYA has the lowest. The average is 35.8625. We can also know the average of citing journals and cited journals of eight Chinese mathematical journals are 253 and 77.5. But the two numbers of the top 8 mathematical journals are 204.625 and 318.25. The gap of these numbers reflects low quality and international influence of our journals.

Table 4
The Citing Data of Eight Chinese Mathematical Journals and the Top 8 Mathematical Journals

Journal	Citing number	Articles	Average citing rate per paper	Citing journals	Cited journals
J COMPUT MATH	964	36	26.8	116	89
NUMER MATH-THEORY ME	998	33	30.2	128	26
SCI CHINA MATH	4742	196	24.2	476	80
ACTA MATH SCI	2849	144	19.8	353	87
FRONT MATH CHINA	1762	83	21.2	260	35
ACTA MATH SIN	3286	184	17.9	404	178
CHINESE ANN MATH B	1148	55	20.9	163	73
ALGEBR COLLOQ	981	67	14.6	124	52
Average	2091.25	99.75	21.95	253	77.5
COMMUN PUR APPL MATH	1701	48	35.4	228	568
J AM MATH SOC	1011	29	34.9	111	264

To be continued

Continued

Journal	Citing number	Articles	Average citing rate per paper	Citing journals	Cited journals
ACTA MATH-DJURSHOLM	574	17	33.8	101	363
ANN MATH	1696	49	34.6	183	524
FIXED POINT THEORY A	8454	315	26.8	497	77
FOUND COMPUT MATH	960	31	31	128	131
INVENT MATH	2160	60	36	205	331
MEM AM MATH SOC	1468	27	54.4	184	288
Average	2253	72	35.8625	204.625	318.25

3. SUMMARY ANALYSIS

Table 5
A Comparative Analysis Between Quantitative Indexes of 8 Chinese Mathematical Journals and the Top 8 Mathematical Journals

Indexes	Average of Chinese mathematical journals (A)	Average of the top 8 mathematical journals (B)	Proportion (B/A)	Average of all the 302 mathematical journals
Articles	99.75	72	0.722	83.44816
Total Cites	526	4184.875	7.96	1168.447
Impact Factor	0.655625	3.231	4.93	0.795082
Immediacy Index	0.107875	0.65525	6.074	0.162017
Self-cited Rate	7.78125	1.6625	0.214	
Average Cited Per Paper	6.77	101.91	15.05	14
Average Citing Rate Per Paper	21.95	35.8625	1.634	
Citing journals	253	204.625	0.809	
Cited journals	77.5	318.25	4.11	
Eigenfactor Score	0.003076	0.016133	5.24	0.0051
Article Influence Score	0.463	4.6865	10.12	0.9497

a) From table 1 we can see, Chinese journals only have a higher number of articles, the other indexes are all lower than that of 302 mathematical journals and even lower than that of the top 8 journals.

b) The article number of the top 8 journals is 72% of eight Chinese journals, but the total cites is about 8 times higher than Chinese journals and the average cited per paper is about 15 times. This shows Chinese mathematical journals have a low international influence.

c) Among 8 Chinese journals, only the impact factor of J COMPUT MATH is above 1 which directly leads to a low average. It should be further improved.

d) The average of immediacy index of Chinese mathematical journals is close to that of 302 mathematical journals, but it is one sixth of the top 8 journals. This means the quality of Chinese articles is on the international average level but is still far from the top.

e) Chinese mathematical journals have a higher self-cited rate but a lower average citing rate per paper. This reflects academic closed and conservative in China.

f) From the low number of eigenfactor score and article influence score we can also see that the international influence of Chinese mathematical journals is not very high and still has a large gap with the top journals.

4. SUGGESTION ON IMPROVING CHINESE JOURNALS

a) Shortening publication cycle. The earlier readers learn the article contents the more probable article being cited. So shortening publication cycle contribute to increase impact factor.

b) Maintaining self-cited rate on the natural level. Artificial increase or decrease self-cited rate is not conductive to the development of journal itself.

c) Suggesting authors trying to use the latest articles to shorten the cited half-life.

d) Accelerating the processes of internationalization. Firstly forming an editorial team with international influence; secondly training editors with international work ethics; thirdly joining global databases to improve international influence; finally cooperating with internationally famous publication group.

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