

# Challenges and Responses in Mathematical Research Publishing

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## A case of plagiarism

The world of scholarly publishing is increasingly challenged by journals which do not uphold basic standards of scholarly integrity. Although they typically claim to implement a peer review process, often the process is non-existent or grossly insufficient. One outcome is that plagiarized material is published.

In 2009 the Society for Industrial and Applied Mathematics (SIAM), a professional organization that publishes about 15 respected journals, encountered such a case when the authors of one its articles found their 175 word abstract, verbatim, on the web page of another journal attached to a paper with a different title and different authors.

SIAM set out to investigate the situation. They first contacted the publisher of the other journal, Research India Publications (RIP), and also its Editor-in-Chief. The publisher did not respond, while the EIC reported that he himself was not able to contact the publisher! SIAM established that the whole paper published in IJSS, not just the abstract, was plagiarized verbatim. However the plagiarized version was severely truncated, constituting just the last five pages of the 25 page SIAM paper, perhaps because RIP imposes a per page charge of \$20 on the authors. Consequently, the paper published by RIP makes little sense. It begins abruptly without introduction, the abstract mostly summarizes materials that had been removed from paper, and the reference list mostly refers to such material.

The situation did not end there. SIAM found that the plagiarizing authors had published or submitted at least half a dozen papers which were copied from other people's work. It then managed to get an admission from the authors by contacting their institutions with this evidence. Once the investigation was complete, SIAM wrote up the outcome in detail, posted it to a public web page, and informed many of the involved parties, including the authors of the original and copied articles and the editorial board of the RIP journal. At this point, eight months after our original inquiry, RIP finally responded to SIAM, with a one sentence email saying it was removing the copied article from its website.

There is a clear financial aspect to these matters. RIP appears to be a for-profit operation, which publishes well over 100 journals in math, science, and engineering. It sells subscriptions, and collects authors page charges. WorldCat lists 116 libraries which subscribe to the journal. Finally, we note that even a very clearcut case, such as the one we outlined, could easily go undetected. Moreover, even when discovered, the sort of investigation described here is extremely time-consuming. More subtle ethical breaches, for example, plagiarism with paraphrase, are correspondingly much more difficult to detect.

## Impact factor manipulation

The impact factor is a bibliometric which has been widely adopted—by libraries, researchers, tenure and promotion committees, and editors and publishers—as a proxy for journal quality. It is calculated simply as the average number of citations in a year to the papers the journal published in the preceding two years. However, careful scrutiny shows that the impact factor is highly unreliable.

The impact factor for a journal in a given year is calculated by as the average number of citations in that year to the articles the journal published in the preceding two years. It has been widely criticized on a variety of grounds. Nonetheless, the lure of a simple number has proven irresistible to many, and consequently this measure has become a target at which journal editors and publishers aim. Impact factor manipulation—gaming the system—has become

common. Some journal editors pressure authors to add citations to boost the impact factor, essentially extorting journal citations in exchange for publication. Others publish review articles which cite their journals profusely, or cultivate authors who can be counted upon for citations. Such practices distort the scientific literature, decreasing journal quality when artificially raising the impact factor.

Such manipulation is hard to detect and mostly known through anecdotal evidence. However, a study by librarian K. Fowler and the author into applied mathematics journals confirm that, indeed, the utility of the impact factor has been seriously compromised by manipulation. We scrutinized in detail the case of the International Journal of Nonlinear Sciences and Numerical Simulation (IJNSNS), which for the past four years has had the highest impact factor in the category of applied mathematics. Informed assessment of the journal is far different: IJNSNS did not even fall within the top 75 applied math journals in a recent expert ranking by the Australian Research Council. Analysis of its anomalous impact factor revealed that a striking proportion of the citations to IJNSNS came from the editors of the journal itself. The journal's most prolific citer, by far, is its Editor-in-Chief; its second and third most citing authors are members of the editorial board as well. Together these three provide about a third of the citations year after year. Another third come from articles published in IJNSNS itself or in other journals and conference proceedings edited by the IJNSNS Editor-in-Chief. These numbers raise red flags, especially since similar checks of benchmark applied mathematics journals reveal only a very small proportion of editor-connected citations. In further evidence of gaming, over 70% of citations to IJNSNS are to articles published in the previous two years, precisely the years that count toward the impact factor (in contrast to 10% which is typical for math journals). Although IJNSNS is an extreme case, further investigation showed frequent discrepancies between expert judgment on journal quality and the impact factor. See Figure 1.

The continued use of the highly flawed impact factor has alarming consequences. Rewards are wrongly distributed, the scientific literature and enterprise are distorted, and cynicism about them grows. The international mathematics community is taking steps to address this challenge. As a start, the International Mathematical Union and the International Council for Industrial and Applied Mathematics recently voted to devise a system of rating mathematical journals based on expert judgment, not simple counting. A successful implementation of such a system would offer a sound journal assessment tool for librarians, editors, researchers, and others, and could provide a model to other scientific fields.

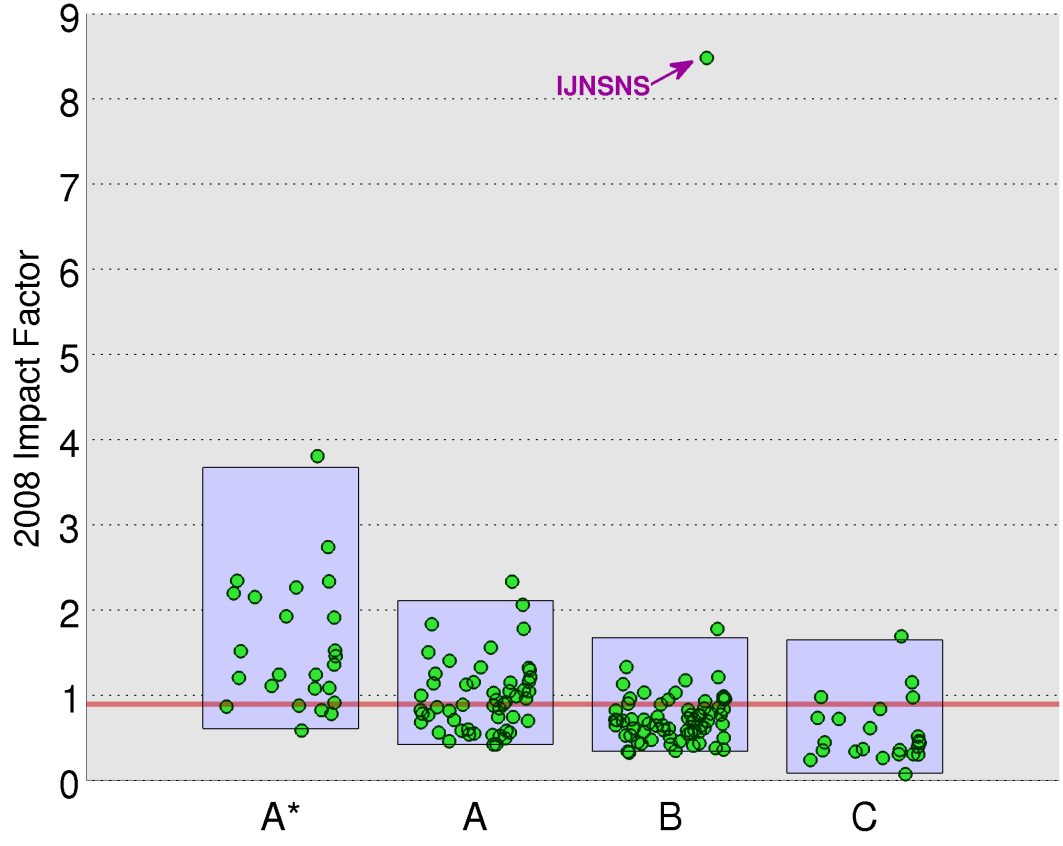


Figure 1: 2008 impact factors of 170 applied math journals grouped according to their 2010 Excellence in Research for Australia rating tier. In each tier, the band runs from the 2.5th to the 97.5th percentile, outlining the middle 95%. Horizontal position of the data points within tiers is assigned randomly to improve visibility. The red line is at the 20th percentile of the A\* tier.