

Letters to the Editor

Retarded Differential Equations and Quantum Mechanics

G. W. Johnson and I wish to draw attention to the work of C. K. Raju that is related to some of the ideas discussed by Sir Michael Atiyah in his talk "The Nature of Space", which we reported on in the June/July 2006 issue of the *Notices*. Ideas suggesting a link between retarded differential equations and quantum mechanics were put forward some years ago by Raju, and we, along with Atiyah, believe they deserve attention. Interested readers are encouraged to read, in particular, the following papers written by Raju:

1. *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994 (Fundamental Theories of Physics, vol. 65), ch. 5b "Electromagnetic time" (pp. 116-122), and ch. 6b "Quantum mechanical time" (pp. 161-189).

2. *The Eleven Pictures of Time*, Sage, 2003, pp. 298-302.

3. "The electrodynamic 2-body problem and the origin of quantum mechanics", *Foundations of Physics*, 34, (June 2004), 937-962.

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The Proof of the Poincaré Conjecture

In recent months there has been considerable attention devoted to the proof of the Poincaré conjecture that was started by Hamilton and completed by Perelman, both among mathematicians and in the media. Although most of the reports are largely true to fact, some incorporate false statements or innuendo which I believe are irresponsible. I am writing this letter to set the record straight.

Let me say first that the Hamilton-Perelman proof of the Poincaré conjecture is a great triumph for mathematics in general and for geometric analysis in particular. I am privileged to have participated in the nurturing of geometric analysis from its infancy

to its adulthood. There were the good old days when ideas were shared and new frontiers were explored. It was during this period that the Ricci flow was introduced and investigated by Hamilton. Thirty years later, geometric analysis has reached maturity, and the proof of the Poincaré conjecture is perhaps its most spectacular success to date. I expect many more successes to come.

The achievements of Hamilton and Perelman in solving the conjecture, especially their major breakthroughs on singularities of nonlinear parabolic systems and the structure theorem for 3-dimensional manifolds, are unparalleled. They far exceed the established standards for Fields Medals. I fully support, and have always said so, the award of the Fields Medal to Perelman. (In my view, Hamilton clearly deserves the Fields Medal also, but he is not eligible at this time because of the age restriction.) For anyone to suggest in words or a cartoon that my position has ever been anything but that is both offensive and completely untrue.

Proving the Poincaré conjecture is an intricate and daunting process. In a work of this scale, it is understandable that when Perelman released his manuscripts on arxiv.org, several key steps were merely sketched or outlined. These manuscripts posed a tremendous challenge for the math community to digest. For two years many top experts in the field of geometric analysis worked hard and made steady progress in understanding and clarifying Perelman's papers. At the end of 2005, Cao and Zhu completed a three-hundred-plus-pages manuscript that provided a complete account of the Hamilton-Perelman proof of the Poincaré conjecture. This paper provides the proof in a form that finally can be understood by researchers in the field.

This past summer while I was in China, I held a press conference and also gave a public lecture on the Poincaré conjecture. My press conference addressed a group of Chinese reporters. Its intention was to encourage young Chinese mathematicians and scientists to be more ambitious and seek the frontiers of research being done worldwide and not just in China.

Young mathematicians in China need not just encouragement but a better perspective of what the most exciting and promising directions of research are. My public lecture in Beijing on June 20 [2006] was addressed to the mathematics community and a large group of string theorists. In that talk I focused on the achievements of Hamilton and Perelman. Since Cao and Zhu managed to put together in writing the details of the deep ideas of Hamilton and Perelman, I praised them as well, hoping this would encourage their fellow mathematicians in China.

Over the years I have inherited from my teacher S. S. Chern the strong belief that it is the duty of any mature mathematician to train the next generation. Since he and I both come from China and there are many talented young Chinese mathematicians who are not exposed to modern mathematics, we have spent a lot of time helping mathematicians and students in China. We devoted a lot of time discussing the challenges and working together to address them. Thanks to his leadership, there are now many outstanding Chinese-trained mathematicians in Western universities. Over the last twenty years, Chern and I have also been trying to develop mathematics within Chinese universities. Because of the Cultural Revolution, the recovery has been slow. But thanks also to the help of many friends from the West, the situation is improving.

There have been uninformed reports on how the Cao-Zhu paper was handled by the *Asian Journal of Mathematics*, as well as on the joint work by Lian, Liu, and me on the mirror symmetry conjecture. Regarding the former, rumor has it that the normal peer review process had been tossed out the window. On the contrary, it took the journal several months to go through the established process until the paper was accepted for publication. After receiving the submission in December 2005, I asked, without success, several leading experts on geometric flows, including Perelman, if they would referee the paper. Under the circumstances, I myself took on the referee's task. After attending more than sixty hours of