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Let's Have Some Letters to the Editor!

FROM THE SIAM PRESIDENT

By Nick Trefethen

What's the sum of $\sin(n)/\log(n)$ from $n = 2$ to ∞? I love this kind of problem, where there's not much hope of a closed-form solution so you have to do your best with numerical approximations. Along the way, you can learn a lot. Admittedly, not all mathematicans enjoy this kind of thing, but *Chacun à son goût*, as my grandmother used to say, which she told me means "Some people like one kind of goo and some people like other kinds of goo."

I assigned this problem to our Numerical Analysis Problem Solving Squad at Oxford last autumn, challenging them to find the answer to ten digits of accuracy. To get ten digits by summing the series directly, you'd need to take about $10^{10000000000}$ terms, so I imagined the students would explore various algorithms for accelerating convergence. I had a trick of my own to show off—multiplying the oscillations by a smooth tanh cutoff window and letting its transition band widen systematically to infinity, which leads to beautiful convergence that can be proved using contours in the complex plane.

Sure enough, the students came up with some clever mathematics. But even cleverer were their Internet discoveries. In particular, they tried typing the problem into WolframAlpha. Well, I'd done that too, and in fact I had picked this particular series because WolframAlpha couldn't seem to sum it. The students outfoxed me. They discovered that although WolframAlpha can't find a numerical sum for $\sin(n)/\log(n)$, it does just fine with $\exp(in)/\log(n)$. From there, to get the answer to the original problem, they just had to take the imaginary part!

There is no doubt about it, we have entered a world where our machines often know more mathematics than we do. Who can say what algorithm WolframAlpha is using? Somebody must know, and maybe I could figure it out by reading around in the documentation; but of course, most of us most of the time don't take the trouble. It is all too efficient to try this and try that among the many e-tools at our disposal, and more and more often, one of these attempts gives us what we want. When I was starting out, computers were deterministic, but now they're pretty well along the track to being intelligent and unpredictable. You may think this is a bad thing, but you can't stop it. We scientists and mathematicians ride the wave like everybody else, trying to do our part to guide it as we ride it.

We're all in this together, this exploding world of science and technology, with its worries and thrills. Somewhere in your jungle of Facebook, Twitter, iTunes, radio, television, e-mails, blogs, and texts, there is a retro little newsprint publication called *SIAM News*, and we hope it gives you some pleasure. We do not aspire to be up to the millisecond, but as a small step toward greater interactivity, some of us have been thinking it might be interesting for *SIAM News* to publish more Letters to the Editor. We begin the experiment in this issue with a collection of letters from readers on an assortment of topics.

Is something on your mind that might be of wide interest to SIAM members? By all means e-mail a letter about it to siamnews@siam.org. A good length is 200 words. Please remember, not every contribution can be published, and the editor may shorten your letter.

The editor of *SIAM News*, incidentally, is a superwoman called Gail Corbett. Gail has been putting together every issue of this newspaper for quite a few years now, and most of us involved in SIAM operations are a bit in awe of her. She is ably assisted by Carol Mehne.

I don't agree with all the letters in this issue. In particular, David Gleich makes the suggestion that we could speed up journal publication by discouraging referees and editors from demanding so many revisions. That's true, probably, but I think the opinion of most SIAM editors would be that we must not even hint at asking editors or referees to cut corners, for the greatest strength of SIAM journals is their peer review, which is certainly not perfect but on balance very good. A letter to the editor that disagrees with the views of the president? Shocking!

A Thoughtful SIAM Community Weighs In—Students, Journals, Software

LETTERS TO THE EDITOR

To the Editor:

I found it quite fitting that an issue (March 2011) focusing on complexity (as the theme of Math Awareness Month, and in Philip J. Davis's review of *Complexity: A Guided Tour*) also has a wonderful article on the complexity of balancing work and family life ("I Am Not Your Supermom—Balancing Family and Work," by Elebeoba May). While an academic career may be the shortest path to our scientific aspirations, it is rarely the path of least resistance. As a postdoctoral scientist continuing his nomadic quest to find an academic position, I am encouraged to hear that the fears of changing goals, priorities, and motivators are not unique to my own thoughts. As the author puts it, "a little bit of disequilibrium and unbalanced equations" in one's life can be frightening, but also enriching.

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To the Editor:

I would like to comment on the impact our SIAM student chapter has had at the University of Arizona. Due to generous support from SIAM and our Program in Applied Mathematics, we have been able to host a wide variety of activities in recent years. Examples include research talks from faculty in many areas of science, professional development activities, such as career panels and introductions to computing, and an astronomy evening in the desert. We have also organized math-themed days for elementary students through the Tucson Kids' Club. These events have provided us with additional perspectives on the benefits and opportunities in studying applied mathematics, complementing our professional training as graduate students. Personally, it has also been very rewarding to interact with faculty who are passionate about integrating mathematics into their research.Many thanks to SIAM for its commitment to encouraging and engaging with students in applied math and related disciplines. I highly recommend that every university start a student chapter if it hasn't done so already!

Rebecca Stockbridge
President, SIAM Student Chapter
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To the Editor:

How can we better engage undergraduates in mathematics?

At UMass Dartmouth, we are addressing this issue with an undergraduate student workshop on research in scientific computing, involving students in real mathematical problems that a professional mathematician would be glad to solve. These research problems come from our own research and scholarship in applied mathematics and mathematics education; contrived problems, with the flavor of book exercises, are often a turn-off for students.

Workshop students are eager to learn new mathematical and computational skills: linear algebra, because the matrices they encounter in radial basis function applications are ill-conditioned; GPU and parallel programming, because of computational work on black holes; developing fast algorithms, because of clique-finding problems in biological networks, for example.

Workshop students learn techniques, including Fourier analysis, and skills like LaTeX, Matlab, Python, Mathematica, and R programming faster and more deeply when topics are "just-in-time."

Engaged students are willing, often keen, to discuss their work in seminars, and at conferences, including those of SIAM, MAA, Wolfram Technology, and Sigma Xi.

Alumni of our workshops report that the skills learned assist them in graduate school and in gaining employment.

For some students, research engagement really seems to work, while for others it's less successful. Should we aim for research engagement to permeate the undergraduate mathematics curriculum, or should it just be an option?

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To the Editor:

As an early-to-mid-career numerical analyst of PDE, I am concerned that software development is not taken seriously enough as an integral part of progress in applied mathematics. I, and I imagine many *SIAM News* readers, spend a big fraction of our time building and testing codes as part of algorithm research, often with a larger user community in mind. The impact of high-quality, reliable, documented software can hardly be overstated—one need only contemplate the duplicated human effort saved by the universal adoption of LINPACK/LAPACK. However, there appears to be a certain intellectual and funding-agency snobbery, that this is not "real mathematics." If one "focuses on the software side rather than on the mathematical theory," this is a bad thing (actually, I quote here from the response to an NSF DMS Computational Mathematics grant proposal!). Yet, without shared documented libraries, we are doomed to reinvent the wheel and, worse, to be unable to verify that everyone's claimed wheels indeed roll, or to compare various wheels and adopt only the one that rolls fastest. We need more support for head-to-head tests of algorithms, and "reproducible research," in the words of David Donoho [1]. (Thus, in recent publications I include example codes that let anyone easily test the algorithms within a toolbox environment.) How can we make our culture and funding more supportive of this essential aspect of computational mathematics and science?

[1] D. Donoho, A. Maleki, M. Shahram, V. Stodden, and I. Ur-Rahman, *15 years of reproducible research in computational harmonic analysis*, 2008, http://www-stat.stanford.edu/~donoho/Reports/.

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To the Editor:

The article on publication times ("Data Mining: 100 Feet of SIAM Journals," *SIAM News*, March 2011) presented a clear question: Are publication times in SIAM journals too long? In short, yes. Just this afternoon I was discussing alternative publication venues with a colleague because "SISC will take two years"—about three months of work left, one month of writing, and an estimated 16 months to publication.

By the time this paper would be published, I'd be almost a third of the way to the tenure review at my new job.

In regards to how to shorten this time, perhaps reviewers and editors could demand fewer revisions. This same question has also been raised in the physical sciences (http://www.nature.com/news/2011/110427/full/472391a.html).

I would enjoy seeing SIAM take a lead and study the impact of these demands on papers.

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