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July 12, 1988

Dr. David H o u g h
Sun Microsystems, Inc.
2550 Garcia Avenue

Mountain View, CA 94043
USA

Dear David:

I thank you for sending me the documents distributed on the occasion of Kahan's lecture series. Meanwhile I read some of Kahan's comments about our work. Most of them are still badly wrong. Most of these comments are based on erroneous premises. With an erroneous premise one can prove anything!

I mention a few of them:

- There is no "methodology" which forbids anything.
- We do not allow only one precision (see page 2 of our book).
- We do not forbid quadruple precision.
- We do not regard exponent overflow as a disaster from which no recovery is possible.
- We do not prefer dot precision to ordinary multiple precision arithmetic, when the latter is useful.
- It is not true that we cannot save arrays of dot precision variables.
- There is no "doctrine that forbids explicit mention of extra-precise variables".
- A Kulisch-Miranker paradigm exists only in Kahan's mind.

It should not be so difficult to understand what we do: Besides an approximation of the operations on the real axis, we require a clean definition of the arithmetic operations in the product sets as well. To achieve this we add the operation of accumulation or dot product defined by semimorphism to existing arithmetic. No other (sloppy) realization of the dot product can be faster than the ones I presented. Since future PC's will have vector qualities these operations are required anyhow. Languages which support them are already available.

We use the computer as everybody else. We just add an additional feature and show that it is useful. Of course our examples use the additional feature. We show that iterative refinement develops its full power with the additional feature. But the conclusion that we do everything with iterative refinement is again wrong.

I am absolutely sure that what we suggest is the right way to proceed and that it is coming. There is a lot of competition in the world and competition is good for the progress of our subject.

I heard from Reinhard Kirchner that you are interested in standard functions with high precision and high accuracy. I did send you two papers which consider this problem by separate mail. Shorter English versions will be published soon in a Supplementum of the Journal Computing edited by Hans Stetter and myself.

Let me remind you that I am planning to be at Stanford University between August 20 and 29. This might give us another apportunity to talk with each other or with others of the group. In principle we are open to cooperation with everybody.

Since Kahan's comments on our work were distributed by your company I ask you to distribute this letter as well.

Sincerly
yours

U. Kulisch

U. Kulisch and H.J. Stetter (eds.)

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