



University of Colorado at Boulder

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Biocomplexity Faculty Search Committee  
c/o Prof. Rob de Ruyter van Steveninck  
Department of Physics  
Indiana University  
Swain Hall West 117  
Bloomington, IN 47405-7105

Dear Professor de Ruyter van Steveninck,

This is a letter in support of Hugh Macmillan. I have known Hugh since the fall of 1996 and had the privilege of acting as Hugh's thesis advisor. Hugh is not only one of the brightest students I have seen in 16 years of teaching but is a truly remarkable young man. I would rate him at the top 2% of graduate students that I have seen.

I first met Hugh when he took a graduate numerical analysis course that I taught in the fall of 1996. He received the second highest mark in that course. I was already impressed with him as a student at that time. In the fall of 1998 I offered Hugh a research position. We decided to find a topic that involved knowledge that he had already developed. We chose the Electrical Impedance Tomography (EIT) problem. Briefly, knowledge of an applied voltage and resulting current (or the reverse) on the surface of an object is used to determine the impedance in the interior. The hope is to identify certain objects that differ from the expected material, such as tumor in the brain. This is an extremely difficult ill-posed problem.

Hugh dove into the literature and at the same time increased his understanding of the relevant mathematics. He developed a new approach that may lead to a much more accurate and robust algorithm for EIT. One of his results was to develop a metric on the function space in which the impedance is assumed to live. This metric can be used to establish a framework that includes several current methods and his new method. The metric and the relation between the methods allows a precise determination of what one can expect to compute with a given level of error in the data. I expect his work to have a significant impact on the field.

In the process of writing his thesis Hugh developed into a fine mathematician. He repeatedly surprised me with new results. His appetite for mathematics is insatiable. When I showed him a trick, he absorbed it, made it his own, and used it in new results.

I would also like to comment on the proposal that Hugh wrote for the Sloan Fellowship. Hugh spent the 2000 Christmas break reading a series of papers on the subject of neural transmission. This was entirely outside of his thesis work. Moreover, it is entirely outside of my area of expertise. I think it is an excellent example of his appetite for new knowledge, his willingness to step outside his current training and his ability to use mathematics in a new setting. I believe this is the essence of applied mathematics: abstracting the concepts and constructs established in one context and applying them in a new context. Hugh was awarded the Sloan Fellowship and he spent the two years at the University of California, San Diego, developing models of neural transmission.

After UCSD, Hugh took a postdoctoral position at Florida State University in the School for Computational Science. There he has concentrated on mathematical models of biological systems. Once again he plunged into the literature in a new field. I believe he has positioned himself well to work at the interface between mathematics and biology.

In the first paragraph I said that Hugh was a remarkable young man. As an example, while a student in Boulder, he volunteered to tutor math and Spanish to underprivileged children in the local area. He is highly self-motivated and knowledgeable in many areas of science. He has a charming and pleasant personality and makes professional contacts at meetings and through email. Hugh has all the ingredients of a very successful scientist. I expect him to become a star.

I give Hugh my highest recommendation.

A handwritten signature in black ink that reads "Thomas A. Manteuffel". The signature is written in a cursive style with a long horizontal flourish extending to the right.

Thomas A. Manteuffel  
Professor of Applied Mathematics