

Report on research visit of Prof. Kailash C. Patidar

[University of Missouri - University of the Western Cape -- Academic Exchange Program for 2017]

This report is based on the questionnaire contained in the UM-UWC exchange application form 2017. As part of this exchange program, I visited the University of Missouri at Kansas-City during 01-30 June. The report answers the following questions:

i. What were the objectives of your visit?

The main objective of this visit was to start collaborative work with experts from UM towards mathematical studies on disease modeling for TB-HIV co-infections affecting South Africa. In particular, we aimed to deal with the three integral part of disease modeling: (i) Modeling, (ii) Analysis and (iii) Simulations. In view of these, we (my host, Dr Naveen K Vaidya and I) intended to (i) Develop spatial-temporal model(s) of reaction-diffusion type to model the dynamics of TB-HIV co-infections in South Africa, and (ii) Do the theoretical and numerical analysis of the model(s) developed in the first step above.

ii. If your objectives were fulfilled, to what do you attribute your success? If not, what were the reasons?

As we anticipated for the first phase of this work, we could find the framework in which to consider the spatio-temporal models for disease modeling. The main success was to have the robust numerical method ready to handle complex systems of these modeling equations.

iii. If you could change any aspect of your visit, what would it have been?

In future, I would anticipate more interaction regarding projects involving graduate students from both institutions (UM and UWC).

iv. How could the planning and preparation for your visit have been improved by UWC?

I travelled for the first time and as such I did not have any difficulty. Admin staffs from both institutions were quite supportive and could assist with any queries timeously in best of their capacity. I commend them for this.

v. What is your overall assessment of the value of the UM / UWC Exchange Program?

I find it very useful due to the fact that it allows larger research groups to interact for longer periods of time unlike formal communications that usually take place during short visits or international conferences. Such exchange programs are very useful for long term projects that involve multiple researchers of different scientific expertise.

vi. If you could change any aspect of the exchange program, what would it be?

Each discipline has its own requirements. My research field is applied mathematics and all my requirements were met as per my timeous requests hence I did not experience anything that needed immediate attention.

vii. Did you encounter any notable problems during your visit?

Almost everything was in order except that the arrangement of an office computer along with a network account took a while.

viii. How will your visit contribute to strengthening and improving programs at UWC?

My main research area is numerical analysis and scientific computing with special focus on solving complex system of differential equations that arise in Life Sciences and Engineering. While we focused

mostly on analysis and simulation aspects of the governing model, this particular visit indeed helped me in understanding how models get modified with change in realistic scenarios. Several day-to-day discussions with my host were extremely helpful during this visit. Those in-depth discussions may help me in considering key parameters that I will be using for most of the mathematical problems that my research team would be solving in future.

ix. Given the opportunity to participate in the exchange again, would you do so?

Yes, definitely.

x. What, if anything, about your exchange experience surprised you?

The fact that our project was well defined, we could execute the tasks efficiently and hence the only surprising factor was focused time that this visit made possible for me.

xi. What did you like most about the program?

Uninterrupted research visits spanning over short to long term visits under this program makes it possible for one to engage with researchers of different levels. In my case, this program gave me the opportunity of having more frequent interactions with the host researcher where both of us could share our findings very critically.

xii. What other observations would you like to share?

Being an applied mathematician, I would encourage my other colleagues to collaborate with larger group of researchers where experts from different domains come on board and can share the ideas. This would definitely improve quality as well as quantity of the research outputs.

xiii. How is the knowledge and experience gained on this exchange program going to influence your future work related endeavors?

It would help me to consider more challenging and difficult models due to the fact that I now understand why models need to be modified and what would significantly change during these modeling processes.

xiv. What specifically will these future endeavors entail?

This would entail the supervision of numerous post-graduate research students and improvement in the quality of publications.

xv. Should the exchange program be continued? If so, why?

Yes definitely. There are many challenging issues that can be well-addressed through such collaborative exchange programs.

In summary, my research visit to UMKC was scientifically very beneficial and it will have long lasting impact on my ongoing research. Indeed, we have obtained some preliminary results for a challenging mathematical model that is hard to solve analytically and are now working on applying that model to a range of epidemiological data sets on South African populations. We anticipate a good research article emanating from this collaborative work.

Finally, I would like to thank my host Dr. Naveen K. Vaidya for hosting me and having many fruitful discussions. I am also grateful to Prof. Uphoff, Prof. Bharuthram and UM-UWC staff for facilitating my trip to UMKC.



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