

ACTIVITY REPORTING FORM
FOR CDC GRANTS PROGRAM
IMU Simons African Fellowship Program

(Deadline for completion: four (4) week after the end of the research visit)

Please note that at least four pictures of the supported activity should be included/ attached to this report. (by email).

After consideration by CDC, the intention is that this activity report and pictures will be made publicly available on the CDC website.

Name of Grantee: Prof. Hassane Bouzahir

Home institution and country of grantee: Ibn Zohr University, Agadir, Morocco

Name of the host: Prof. Alessandro do Nascimento Vargas

Name of the host institution and country: Federal University of Technology (FUT), Parana, Brazil

Topic of the research activity: Stochastic Dynamical Systems and Application in Engineering

Dates spend at the center/host institution: 16.08.2018 to 15.09.2018

The progress report should a brief (one page) activity report:

1. Summary statement (1-2 sentences) of major outcome of your visit:
After completion of the visit, we have achieved many goals such as finishing the writing of a research paper and discussion and improvement of the content of another one. In addition, we have defined new area of research and collaboration with some other researchers in Spain and Switzerland. Among them, Prof. Leonardo Acho Zuppa from Universitat Politècnica de Catalunya Barcelona who was also a visitor.
2. Brief description of your research activities during your research visit:
My visit the Federal University of Technology, Parana, Brazil was an opportunity for me to discuss modelling and definition of problems on stochastic differential equations. Many types of equations and stability of their solutions were discussed such as the cases of (infinite) delay, Markov, Brownian and Poisson jumps, impulsive and integr-differential equations and p-mean square and exponential.
3. Students and post-doctoral fellows advised:
We have a Ph D student that is co-advised on this subject. Namely, Aziz Zouine. His research is ongoing very well, thanks to that collaboration with Prof. Vargas.
4. Joint activities with your host:
During my visit to Prof. Vargas, we have been mainly working on conditions to assure existence, uniqueness, and stability of solutions for neutral stochastic integro-differential equations with infinite delay and Poisson jumps. We have used integral inequalities, together with some mild assumptions that assure mean square exponential stability of the equation. We have been also able to give examples that illustrate the effectiveness of our results.
3. Research in progress (as a result from the visit):
The research that is in progress is the one given recently to another Ph D student also co-directed by Prof. Vargas. It deals with stochastic stability of a class of linear discrete-time Markovian jump systems whose dwell-time is driven by a Poisson process. Several notions of stochastic stability are considered and the corresponding stability criteria are derived.
4. Papers published or in preprint form as a result from the research visit:
 - A. Zouine, H. Bouzahir and A. N. Vargas, Stochastic neutral integro-differential equations with infinite delay: conditions for existence and exponential stability. (Submitted).
 - H. Bouzahir, A. Zouine and A. N. Vargas, Neutral stochastic delay systems with Markovian switching and Levy noise: conditions for exponential stability. (To be submitted).
5. Planned future activities as a result of your research visit:
I plan to visit that laboratory every year during the two last weeks of August.