ACTIVITY REPORTING FORM

FOR CDC GRANTS PROGRAM
Abel Visiting Scholar 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: **Neda Khodabakhshi**
Home institution and country of grantee: **Amirkabir University-Iran**
Name of the host: **Andrei Korobeinikov**
Name of the host institution and country: **Centre de Recerca Matemàtica, Spain**
Topic of the research activity: **Analysis of nonlinear fractional differential and integro-differential equations and their applications to mathematical medicine and biology**
Dates spend at the center/host institution: **07.02.2019--07.04.2019**

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

1. Summary statement (1-2 sentences) of major outcome of your visit:
2. Brief description of your research activities during your research visit:
3. Students and post-doctoral fellows advised:
4. Joint activities with your host:
5. Research in progress (as a result from the visit):
6. Papers published or in preprint form as a result from the research visit:
7. Planned future activities as a result of your research visit:

During my 2-month visit to the Centre de Recerca Matemàtica (CRM), I collaborated with Prof. Andrei Korobeinikov. The title of the project is “Analysis of nonlinear fractional differential and integro-differential equations and their applications to mathematical medicine and biology’’ and we made an excellent progress towards our aim of developing a new model for Viral infection disease.
It is shown that there exist up to four equilibria. By analyzing the characteristic equations, the local stability of the infection-free equilibrium of the model are established. By using suitable Volterra-type Lyapunov functions and LaSalle invariant principle, we consider the global stability of the equilibrium states. Furthermore, we find explicit Basic Reproduction Numbers R_0 and Q_0 by using the idea of Next Generation Matrix, and we investigate the conditions that saddle-node bifurcation occurs.
Moreover, some numerical simulations are performed to illustrate the analytical results. This research is on progress, to publish it in an appropriate journal.

With my signature I agree that my Activity Report and pictures can be published on the CDC website.

Date: 02.03.2019
Signature Grantee: Khodabakhshi