FACULTAD DE CIENCIAS
FÍSICAS Y MATEMÁTICAS
UNIVERSIDAD DE CHILE

CMM
Center for
Mathematical
Modeling

cmm.uchile.cl

Beauchef 851, edificio norte, Piso 7
Santiago, Chile
CP 837 0456

Tel. +56-2 2978 4870

SEMINARIO

OPTIMIZACIÓN Y EQUILIBRIO

EXPOSITOR

Benjamin Ivorra,
Complutense University of Madrid

TITULO

Be-CoDiS: A mathematical model to predict the risk of human diseases spread between countries. Validation and application to the 2014-15 Ebola Virus Disease epidemic

RESUMEN: Ebola virus disease is a lethal human and primate disease that currently requires a particular attention from the international health authorities due to important outbreaks in some Western African countries and isolated cases in the United Kingdom, the USA and Spain. Regarding the emergency of this situation, there is a need of development of decision tools, such as mathematical models, to assist the authorities to focus their efforts in important factors to eradicate Ebola. In this work, we propose a novel deterministic spatial-temporal model, called Be-CoDiS (Between-Countries Disease Spread), to study the evolution of human diseases within and between countries. The main interesting characteristics of Be-CoDiS are the consideration of the movement of people between countries, the control measure effects and the use of time dependent coefficients adapted to each country. First, we focus on the mathematical formulation of each component of the model and explain how its parameters and inputs are obtained. Then, in order to validate our approach, we consider two numerical experiments regarding the 2014-15 Ebola epidemic. The first one studies the ability of the model in predicting the EVD evolution between countries starting from the index cases in Guinea in December 2013. The second one consists of forecasting the evolution of the epidemic by using some recent data. The results obtained with Be-CoDiS are compared to real data and other models outputs found in the literature. Finally, a brief parameter sensitivity analysis is done. A free Matlab version of Be-CoDiS is available at: http://www.mat.ucm.es/momat/software.htm. This is a joint work with Diène Ngom, Ziguinchor University, Ziguinchor, and Ángel M. Ramos, Complutense University of Madrid.

Miércoles 22 de julio a las 16:30 hrs, Sala de Seminarios John Von Neumann CMM, Séptimo Piso, Torre Norte, Beauchef 851.