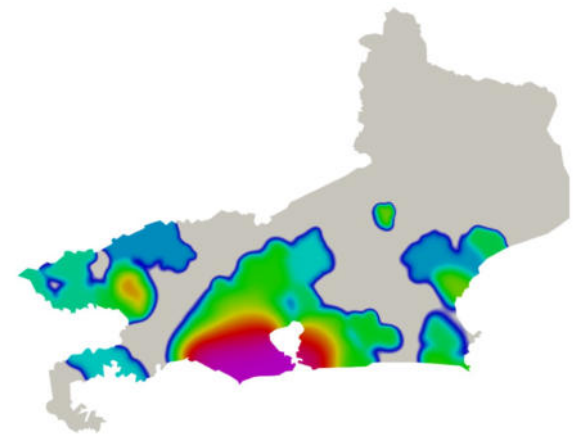
Colóquio Interinstitucional

Modelos Estocásticos e Aplicações

Quarta-feira, 13 de setembro de 2023

14:30h - 15:50h – **Malú Grave (UFF)**

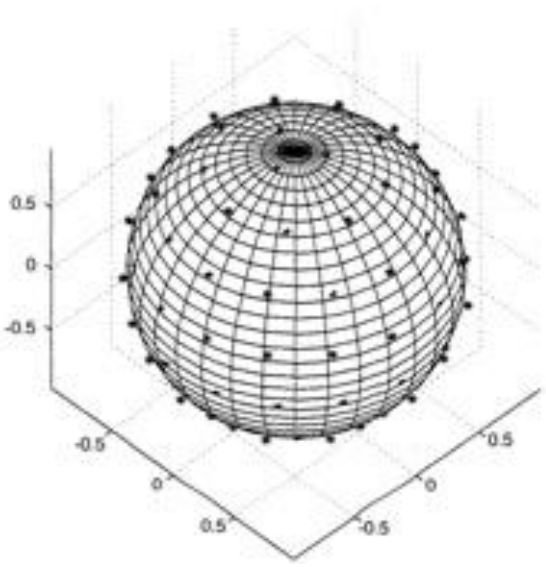
Modeling the Spatio-temporal Spread of COVID-19 via a Reaction-diffusion System



The COVID-19 outbreak in 2020 sparked significant interest in mathematical models of infectious diseases. These models categorize the population into compartments based on characteristics. While often expressed as ordinary differential equation (ODE) models, which depend solely on time, recent research has explored partial differential equation (PDE) models, particularly reaction-diffusion models that incorporate spatial variation in epidemics. These PDE models, within the Susceptible, Infected, Exposed, Recovered, and Deceased (SEIRD) framework, have shown promise in describing COVID-19's progression. However, the rapid movement of people over long distances can result in nonlocal disease transmission, a phenomenon not well represented by diffusion alone. In contrast, ODE models can account for this by treating different regions as network nodes, connected by edges to represent nonlocal transmission. To address these complexities, a reaction-diffusion PDE model is developed with an integrated network structure. This approach aims to enhance our understanding and prediction of COVID-19 contagion dynamics in a more realistic and comprehensive way.

16:10h - 17:30h – **Lisandro Lovisolo (UERJ)**

Generation of Uniform Point Distributions on Hyper-Surfaces: Methods and Applications



In many applications, it is necessary to obtain point arrangements on a hypersphere (or N-sphere) that are approximately uniform from a geometric perspective, i.e., with approximately constant angles between each point and its nearest neighbors. We discuss the use of these distributions in various applications. This problem is trivial in a two-dimensional space (N=2), and there are known solutions for certain quantities of points (K) in specific-dimensional spaces (N). On the other hand, the problem of selecting points uniformly distributed in a probabilistic sense is solved using Gaussian random variables. We describe how to generate geometric arrangements of approximately K uniformly distributed points on an N-sphere from uniform point distributions on the N-sphere.

17:30 - 18:00 – Discussão e lanche

Local

Auditório RAV 62, 6^{o} andar, Bloco F
UERJ — Campus Maracanã
Rua São Francisco Xavier, 524
Maracanã, Rio de Janeiro - RJ

Contatos

Americo Cunha (UERJ)
Evaldo M. F. Curado (CBPF)
João Batista M. Pereira (UFRJ)
Leandro P. R. Pimentel (UFRJ)
Maria Eulália Vares (UFRJ)
Nuno Crokidakis (UFF)
Roberto I. Oliveira (IMPA)
Simon Griffiths (PUC-Rio)
Yuri F. Saporito (FGV-EMAp)

www.im.ufrj.br/∼coloquiomea

Realização: CBPF, FGV EMAp, impa, PUC-Rio, UERJ, UFF

Apoio: FAPERJ