

Séminaire de l'axe Pharmacométrie et pharmacothérapie

Optimal Impulsive Control for Cancer Therapy



João P. Belfo, MSc

Grant researcher
INESC-ID, Lisbonne, Portugal

Jeudi 25 mars 2021 – 13h00 – Via Zoom

à l'invitation de la professeure Fahima Nekka

Designing therapies for patients on the basis of control engineering principles has several advantages. This approach is specially relevant in the case of illnesses, like HIV-1 infection, or cancer, or treatments with heparins, where the drugs administered have a therapeutical as well as a noxious effect. In these cases, control engineering methods provide a systematic mean to optimize the therapy, selecting a time profile of drug dosing that finds the best compromise, according to an objective criterion, between therapeutic and toxic effects.

In this respect, one difficulty consists in the fact that most therapies are not applied in a continuous way, but instead correspond to intensive actions of very short duration, such as the ingestion of pills, that are best modeled by a manipulated variable function that corresponds to a train of impulses with varying amplitude. To tackle this issue, most research works consider as manipulated variable the drug effect, which is a continuous function. Although this approach has the advantage of simplifying the class of optimal control problems considered, it has the serious drawback of neglecting the important part of drug pharmacokinetics in the physiological model and is less realistic. Instead, the presentation addresses the design and computation of impulsive control therapies.