

## OPTIMAL CONTROL PROBLEM FOR AN HIV MODEL IN CASE OF PRE-EXPOSURE PROPHYLAXIS AND SCREENING

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Optimal control problems offer ways to set up appropriate policies to reduce the number of infected individuals within a population. Human immunodeficiency virus (HIV), which is one of the life threatening viruses, infected about 36.9 million people and almost 940.000 people died due to HIV related illnesses in 2017 [1]. Some treatment and prevention strategies are applied such as antiretroviral therapy, HIV counselling and testing, and the pre-exposure prophylaxis (PrEP) [2]. Indeed, spread of an infectious disease among individuals is not an instantaneous process. On the contrary, it is influenced by memory. Therefore, we consider a Caputo time fractional model to express the spread of the disease [3]. The main goal of this study is to investigate the contribution of screening rate and the rate of administration of PrEP, so we apply optimal control theory to a population-based model in case of PrEP and screening to reduce the number of infected individuals. Illustrative examples show the contribution of optimal control over uncontrolled case and we determine the optimal prevention strategies together with the impact of the fractional order.

### REFERENCE

- [1] World Health Organization, <http://www.who.int/hiv/en/>.
- [2] Centers for Disease Control and Prevention, <http://www.cdc.gov/hiv/basics/prep.html>.
- [3] Carla M.A. Pinto, Ana R.M. Carvalho, The impact of pre-exposure prophylaxis (PrEP) and screening on the dynamics of HIV, *JCAM* 339 (2018) 231–244.