Eighth Workshop Dynamical Systems Applied
to Biology and Natural Sciences DSABNS 2017
Évora, Portugal, January 31st - February 3rd, 2017

MULTIOBJECTIVE OPTIMAL CONTROL PROBLEMS ARISING FROM EPIDEMIOLOGY

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Optimal control problems often follow after creations of epidemic models so as to determine effective and economically viable treatments. There is a list of usual objectives to take into consideration including, just to name a few, minimizing the size of infected population, minimizing cost for treatments, tracking part of or all state variables, and acquiring some terminal payoffs. In a single objective optimal control, those objectives typically are augmented into one by which the relative importance of each objective is pronounced by a weighting constant called regularization parameter. Different impositions of regularization parameters in the objective functional lead to different optimal solutions, making the problem no longer robust against subjective impositions. In this communication we seek all possible optimal solutions *at once* with the aid of multiobjective optimization, where we basically can minimize many separated objective functionals simultaneously. We propose to use a divide and conquer algorithm with diagonal framing principle for solving mutiobjective optimal control problems, i.e. discovering a discrete representation of PARETO optimal solutions. Several problem cases arising from epidemiology were tested and discrepancies of optimal solutions under Hypervolume metric were investigated. The results indicated the applicability of the method, resulting in agreeably good discrepancies.

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 ISBN: 978-989-98750-3-6

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 ISBN: 978-989-98750-3-6