Optimal control of size-structured population in tropical forest management

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In this work, we are interested in the problem of management of tropical forest taking into account intra-species competition. Our goal is to maximize the revenues from timber production. The tropical forest population dynamics is described by a mathematical size structured model where the birth, growth and mortality rates depend on both the individual size together with the interspecies competition term. The existence of solution using fixed point theory for the the size structured population model with a nonlinear growth is shown. Then, the optimal control problem of forest management under timber production is studied, and the optimal control function is characterized by an optimality system.

References

[1] A. Calsina, J. Saldana, *A model of physiologically structured population dynamics with a nonlinear individual growth rate*. J. Math. Biol.,33 (1995) 335-364.

[2] S. ANITA, A. VIOREL, V. CAPASSO *An introduction to optimal control problems in life sciences and economics. From mathematical models to simulation in MATLAB, Modeling and Simulation in Science Engineering and Technology*. Birkhäuser (2011).

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[3] J. L. LIONS, E. MAGENES *Problèmes aux limites non homogènes*. Dunod (1968).