Min-max gam problem and Riccati equation

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Abstract: Min-max control problems defined for a large class of PDE models will be considered. A distinct feature of the problems under consideration is the fact that control function (counteracting potential disturbances in minimizing given objective) acting upon the system distributionally (not functionally). This happens typically when a control has very small support such as bounded or point controls. Our goal is to establish well-posedness of a non-standard Riccati equation, where the solution yields a feedback operator deriving the optimal solution. Our work deals with non-smoothing dynamics as they arise in hyperbolic-like problems. We shall show that under the assumption of singular estimate imposed on the dynamics (A, B), (A the generator, B the control), well-posedness of Riccati equation is guaranteed and the solution for min-max problem can be derivated by solving Riccati equation.

The assumption is motivated by a new class of controlled systems that is arising in hyperbolic-parabolic interacting (coupled system) such as:

- structured acoustic model;
- fluid structure model;
- thermoelastic plate model;

The detailed formulation of the problem is given later.