We consider the Mayer optimal control problem with dynamics given by a nonconvex differential inclusion, whose trajectories are constrained to a closed set and obtain necessary optimality conditions in the form of maximum principle together with a relationship between the costate and the value function. This additional relation is applied in turn to show that the maximum principle is non degenerate.

To derive these results we use convex linearizations of differential inclusions and convex linearizations of constraints along optimal trajectories. Then duality theory of convex analysis is applied to derive necessary conditions for optimality. In this way we extend the known relations ([1], [3], [4]) between the maximum principle and dynamic programming for the unconstrained problems to the constrained case.

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