A Planar Geodesic Constrained on the Maximum Curvature and with Prescribed Initial and Terminal Directions : An Optimal Control Approach

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abstract

A planar geodesic (2-dimensional minium length curve between two points) on which the maximum curvature is constrained and with prescribed initial and terminal directions is studied. A generic problem is formulated by the minimum-time optimal control problem in free terminal time. It is shown that the optimal path (G^{2*}) may contain a singular arc or not and that the general types of G^{2*} can be classified into 3 classes. The explicit form of G^{2*} is derived by geometric considerations based on the main theorem of this article. Finally, the solution characteristics of the generic problem are investigated by showing G^{2*}-maps in various parameter conditions.