

Let M be a compact connected M -dimensional real analytic manifold with boundary and ϕ be a primal navigation function; i.e. a real analytic Morse function on M with a unique minimum and with minus gradient vector field G of ϕ on M pointed inwards along each coordinate. Related to a robotics problem, we define a sequential hybrid process on M for G starting from any initial point q_0 in the interior of M as follows: at each step, we restrict ourselves to an affine subspace where a collection of coordinates are fixed and allow the other coordinates change along an integral curve of the projection of G onto the subspace. We prove that provided each coordinate appears infinitely many times in the coordinate choices during the process, the process converges to a critical point of ϕ . That critical point is the unique minimum for a dense subset in primal navigation functions. We also present an upper bound for the total length of the trajectories close to a critical point.

