More on Anchoring and Anchorability

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Abstract

We first update results on classical anchoring. In the prior year we had discussed a potential-dissipative method for anchoring sagittal plane dynamics in spatial Lagrangian systems through the imposition of a Morse-Bott function on SO(3). The stability proof using total energy relied upon LaSalle's theorem and thus failed to capture the robust empirical success of this approach to parallel composition of dynamical attractors. Over the past year we have replaced total energy with an augmented Lyapunov candidate which can be shown to be strict on the anchoring space. The analysis proceeds by appeal to intrinsic comparison functions that exploit the Hopf fibrationof SO(3), using closed form expressions for the Sasaki geodesic metric on TS^2. The formal results now correspond much more closely to the empirical efficacy of the construction by guaranteeing very large basins of attraction around the sagittal plane on which are permitted nearly arbitrary "reasonable" template motions, i.e., only subject to the assumption that they have bounded kinetic energy and, if infinitesimally generated, are BIBO stable. The talk concludes with some further brief speculative remarks bearing on a reconsideration of how to frame the characterization of hybrid guardset affordance in the robotics setting.