Towards a Categorical Framework for Open Hybrid Systems

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Abstract

A major goal stated in our group's project proposal is to formulate an extension of HDIs with control inputs into a category-theoretical framework of open hybrid differential inclusions (OHDIs) capable of (a) serving as a basis for discrete analysis using Conley-theoretic tools, (b) provide a substrate for the modeling and design of hierarchical hybrid control structures, and (c) enable a discussion of how interconnections and spatial compositions affect controllability properties of complex OHDIs.

I will discuss how different use-cases in current collaborations with members of our group inform requirements of such a framework. In one instance I will examine the case of DSGRN with the possibilities and limitations of exploiting its discrete representation of dynamics for control. In another instance, I will survey an approach we intend for obtaining non-flat principal bundles as limits of flat hybrid ones.

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