

**Abstract:**

Abstract—Real world Multi-Vehicle Motion Planning (MVMP) problems require the optimization of suitable performance measures under an array of complex and challenging constraints involving kinematics, dynamics, communication connectivity, target tracking, and collision avoidance. The general MVMP problem can thus be formulated as a mathematical program (MP). In this paper we present a mathematical programming (MP) framework that captures the salient features of the general MVMP problem. To demonstrate the use of this framework for the formulation and solution of MVMP problems, we examine in detail four representative works and summarize several other related works. As MP solution algorithms and associated numerical solvers continue to develop, we anticipate that MP solution techniques will be applied to an increasing number of MVMP problems and that the framework and formulations presented in this paper may serve as a guide for future MVMP research.

**BibTex Reference:**

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