When specifying and designing controllers for complex systems, high-level languages are needed in order to manage the complexity. However, the price one has to pay for this abstraction-level is a lack of physical details that must be provided at a lower level. We address this problem within the context of robotic marionettes by proposing a so-called motion description language for specifying and encoding autonomous puppetry plays in a manner that is faithful to the way puppetry choreography is currently formulated. In particular, what results is a formal language whose strings, when parsed by a dynamical system (the puppet) produces optimized, hybrid control laws corresponding to strings of motions, locations, and temporal durations for each agent. And, even though the global performance objectives are centralized, by locally optimizing (based on so-called team theory for min-max optimization) the timing of the different movements, entire plays can be performed. Experimental results illustrate the operation of the proposed method.

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