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Jason Erbele* (erbele@math.ucr.edu). *Controllability and observability: diagrams and duality.*

Diagrams of systems appear in many different fields of study, and for good reason: they can dramatically simplify communication of and calculations with those systems. In many cases, large diagrams can be viewed as coming from piecing together smaller diagrams in ways that preserve important data, and complicated diagrams can be rewritten to produce simpler diagrams that represent the same behavior. Category theory provides a framework to reason with diagrams as mathematical objects that can be composed and transformed by rewrite rules. In particular, for linear, time independent control systems, the dual notions of controllability and observability can be expressed in terms of the dual notions of epimorphism and monomorphism, as applied to certain composite diagrams. (Received August 25, 2017)