Invariant varieties for rational control systems

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In [3], polynomially nonlinear state-space systems

$$\dot{x}(t) = f(x(t)) + g(x(t)) \cdot u(t), \quad y(t) = h(x(t)) \tag{1}$$

and given algebraic varieties were considered. A variety V is said to be controlled invariant w.r.t. (1) if we can find a polynomial state feedback law $u(t) = \alpha(x(t))$ that causes the closed loop system $\dot{x}(t) = (f + g\alpha)(x(t))$ to have V as an invariant set. If this task can be achieved by a polynomial output feedback law $u(t) = \beta(y(t))$, then V is called controlled and conditioned invariant. In this talk, we want to generalise this concept from polynomial systems to rational ones and also allow the feedback law to be rational. We give algebraic conditions for a variety to be controlled (and conditioned) invariant for rational control systems and algorithms (using methods from the theory of Gröbner bases), which may decide this and produce corresponding state (or output) feedback laws.

References

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