

Y. Orlov (yorlov@cicese.mx), CICESE Research Center, P.O. Box 434944 San Diego, CA 92143-4944, *Control Applications of Schwartz' Distributions in Nonlinear Setting*

Schwartz' distributions theory is developed in a nonlinear setting. In order to describe complex dynamic systems with impulsive inputs, the meaning of differential equations in distributions is extended. Generalized solutions for these equations are introduced via the closure, in a certain topology, of the set of the conventional solutions corresponding to standard integrable inputs. Mathematical models proposed involve nonlinear and, generally speaking, non single-valued operating over distributions. The instantaneous impulse response of a nonlinear system is shown to depend on the impulse realization. The complete integrability of a certain auxiliary system appears to guarantee the uniqueness of the impulse response. The theory is demonstrated to be eminently suited to optimal impulsive feedback synthesis, filtering of stochastic and deterministic dynamic systems over sampled-data measurements, and the analysis of mechanical systems with impulsive phenomena.