

# Transferring control properties in a non-linear Stieltjes system\*

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**1. Introduction** - In this paper we give conditions for transmit controllability properties from discrete systems to a nonlinear Stieltjes integral equation

$$(S) \quad x(t) + \int^t d\alpha(s)f(s, x(s)) = u(t) \quad t \in [a, b]$$

[with both the state -  $x$  - and input -  $u$  - variables, having values in B-spaces and being regulated, and the Niemitskij operator generated by  $f$  being well-defined on the regulated functions spaces.]

**2. The approximation scheme** - In [1] it is done a method that allows us to synthetize a sequence of time discrete systems

$$(S_n) \quad x_n + A(x_n) = u_n$$

[where  $A$  is a linear operator and  $u_n$  is done by  $u$  in (S)] in such a way the solutions  $x_n$  in  $(S_n)$  (actually step functions) converge uniformly to the solutions  $x$  of (S).

This approximation scheme yields - according the method developed in [2] - the possibility of (S) to have control properties inherited from the properties in  $(S_n)$  (actually easier of to be checked).

A numerical scheme for this transmission of properties is provided using the interior point method (in fact a barrier algorithm) by V. Zadhan (see e.g. [3]).

## Reference

- [1] L. Barbanti - Linear Stieltjes equation and existence of regulated solutions. (Preprint), 1997.
- [2] Fernandez, H. & Herdman, T. - Transferele control properties and semi-groups. (Techn. Report - VPI - n. 25 - 1992).
- [3] Evtushenko, Yu. & Zadhan, V. - Barrier-projection methods, Comp. Math. Math. Phys. 34 (1994) n. 5, 579-590.

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