# Generalized Operators and Symbolic Computation for Nonlinear Systems

**Miroslav Halás**

Department of Automation and Control
Faculty of Electrical Engineering and Information Technology
Slovak University of Technology
Ilkovičova 3, 812 19 Bratislava, Slovakia

*E-mail:* miroslav.halas@stuba.sk

**Keywords:** nonlinear system, algebraic approach, differential operators

**Abstract:** In linear systems Laplace transformation plays an important role, since it enables us to design controllers, switch between different types of system representations (mainly between a state-space description and an input-output representation). For those purposes we use well known transfer functions.

Obviously, the situation is different when systems are nonlinear. The main problem, which makes the analysis and synthesis of such systems difficult, is an invalidity of basic principles employed in linear systems. Above all, it is the invalidity of the associativity which disables us to employ a linear theory and transfer functions. Nevertheless, an algebraic point of view, which presented paper introduces, enables to define a similar symbolic computation. From that point of view differential and derivative operators play a key role. In terms of the introduced symbolic computation the paper tries to depict a solution to a few basic control problems, namely a problem of modeling and a control design for nonlinear systems.

In other words, presented paper tries to show you that there is no reason to believe well known dogma saying that nonlinear systems have no transfer functions.

## References

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