Alex Martsinkovsky (Northeastern University, Boston, USA)

The Defect of an Additive Functor and Linear Control Systems

Abstract
A linear control system is just an underdetermined system of linear differential or difference equations. Algebraically, this is a system of linear equations in a module over a suitable ring of differential operators. Writing it in a matrix form and taking the transpose of the matrix, one has the module finitely presented by that transpose, called here the Malgrange module of the system. The part of the system that cannot be controlled is called the autonomy of the system. Algebraically, it corresponds to the torsion of the Malgrange module. The goal of this talk is to show that the autonomy can also be expressed in terms of a certain functor associated with the Malgrange module. This requires a new concept, called the defect of an additive functor. The advantage of the new approach is that it allows to introduce a dual concept, which poses questions about its control-theoretic interpretation.