Algebratizing Differential Geometry: Linear Differential Operators

Abstract:

It is frequently the case that certain objects in differential topology/geometry can be described in purely algebraic terms, where the algebraic structures involved are constructed using the smooth structure(s) of the underlying manifold(s). For example, a common equivalent characterization of a smooth vector field on a smooth manifold $M$ is a derivation of the $\mathbb{R}$-algebra of smooth real-valued functions on $M$. I shall discuss this example and describe how it led me to a considerably more involved one: linear differential operators on $M$. This talk should be of interest to anyone who likes differential topology/geometry, algebraic geometry, or algebra.