Exterior differential systems and local solvability

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April 26, 2023
17:00-18:00h on campus in M.G.004
Analysis & Geometry Seminar, Antwerpen

In this talk, we discuss *Exterior Differential Systems* (EDS). In particular, they can be used to prove existence of local solutions to systems of PDEs, by expressing them as an EDS with an independence condition. Indeed, computing integral manifolds of an EDS is equivalent to computing (local) solutions.

In general, it is very difficult to compute solutions. However, using EDS one can analyse properties of the system using only linear algebra (by constructing a *tableau*).

Of particular importance is the so-called *Cartan–Kähler theorem*, which tells us that if an EDS satisfies a certain condition, then the system has integral manifolds. Moreover, it tells us how general the set of solutions of the associated system of PDEs is.

This talk will consist of:

(1): Some motivation.
(2): An introduction to EDS and its relation to systems of PDEs.
(3): Tableaux and the Cartan–Kähler theorem for linear Pfaffian systems.
(4): If time allows, we discuss how EDS was applied to solve some nontrivial problems (e.g. the inverse problem for Lagrangian mechanics).