

Passive Complete Orthonomic Systems of PDEs and Riquier Bases of Polynomial Modules

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The object of this talk is to enlighten the relationship between the two classical theories of passive complete orthonomic systems of partial differential equations (PDEs) at the one hand side and of Gröbner bases of finitely generated modules over polynomial rings at the other hand side. The link between both types of canonical forms are the Riquier bases (also called ‘involutive bases’ in the literature) which are at the same time a particular type of Gröbner bases carrying some additional structure and a natural translation of the notion of passive complete orthonomic systems of PDEs into the language of polynomial modules.

We will point out some desirable applications which a “good” notion of Riquier bases could provide. In particular, we will consider a theoretical application in combinatorial algebra which shows that the importance of Riquier bases is not restricted to only the vague hope to design a new faster algorithm for computing Gröbner bases. Unfortunately, the requirements arising in different applications turn out to partially collide which leads us to the discussion on finding a reasonable compromise.

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