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The Eckardt Point Configuration of Cubic Surfaces Revisited

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Abstract

The classification problem for cubic surfaces with 27 lines is concerned with describing a complete set of the projective equivalence classes of such surfaces. Despite a long history of work, the problem is still open. One approach is to use a coarser equivalence relation based on geometric invariants. The Eckardt point configuration is one such invariant. It can be used as a coarse-grain case distinction in the classification problem. We provide an explicit parametrization of the equations of cubic surfaces with a given Eckardt point configuration over any field. Our hope is that this will be a step towards the bigger goal of classifying all cubic surfaces with 27 lines. This is a joint work with Anton Betten from Kuwait University.

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