

# On the arithmetic of the discriminant for cubic surfaces

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*Communicated by: Vikram Balaji*

Received: April 28, 2011

**Abstract.** The 27 lines on a smooth cubic surface over  $\mathbb{Q}$  are acted upon by a finite quotient of  $\text{Gal}(\overline{\mathbb{Q}}/\mathbb{Q})$ . We construct explicit examples such that the operation is via the index two subgroup of the maximal possible group. This is the simple group of order 25920. Our examples are given in pentahedral normal form with rational coefficients. On the corresponding parameter space, we search for rational points, discuss their asymptotic, and construct an accumulating subvariety.

*1991 Mathematics Subject Classification.* Primary: 11G35; Secondary: 14J20, 14J45, 11G50.