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Computing the Regulator of a Real Quadratic Field

The regulator is an important invariant of a real quadratic number field, due to its close connection to fundamental solutions of the Pell equation and to cryptographic applications using such fields. We will describe state-of-the-art methods for computing the regulator that are effective for fields with discriminants as large as 100 decimal digits. These methods use the index-calculus strategy, and as such require time-consuming linear algebra calculations over the integers, which will be highlighted in this talk.