

Maxima of polynomials and small regulators

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A recurrent topic in algebraic computational number theory is the classification of number fields with bounded invariants, in particular the discriminant and the regulator. A method for the tabulation of fields with small regulator was developed by Astudillo, Diaz y Diaz and Friedman, and it needs a specific polynomial to be estimated as better as possible over a certain hypercube. We present the optimization methods we employed to obtain the desired maximum in two cases: the first one is the case of totally real fields, where our procedure yields the sharp maximum in every degree, thus solving a conjecture by Pohst. The second one involves fields with a unique complex embedding and degree at most 9, and it certifies for the first time the smallest regulator for fields of degree 8 and 1 complex embedding.