On the Resolution of Index Form Equations in Dihedral Quartic Number Fields

István Gaál
Atilla Pethő
Michael Pohst

Abstract

We describe a new algorithm, based on sieving procedures, for determining the minimal index and all elements with minimal index in a class of totally real quartic fields with Galois group D_8. It is not universally applicable, but its applicability is easily checked for any particular example, and it is very fast when applicable. We include several tables demonstrating the potential of the method.

Finally, we present a family of totally real quartic fields with Galois group D_8 and having minimal index 1 (that is, a power integral basis).