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91j:11092 [11R20](#) ([11R27](#) [11R29](#))

Shen, Yuan-Yuan ([1-CATH](#))

Unit groups and class numbers of real cyclic octic fields.

Trans. Amer. Math. Soc. **326** (1991), no. 1, 179–209.

D. Shanks studied the simplest cubic fields [*Math. Comp.* 28 (1974), 1137–1152; [MR 50 #4537](#)], and M.-N. Gras studied the simplest quartic and sextic fields [*ibid.* 48 (1987), no. 177, 179–182; [MR 88m:11092](#)]. On the other hand, G. Cornell and L. Washington pointed out a systematic way of constructing polynomials whose roots generate these fields, by working in the group $\mathrm{PGL}_2(\mathbf{Q})$ [*J. Number Theory* 21 (1985), no. 3, 260–274; [MR 87d:11079](#)].

In this paper, following the procedure of Cornell and Washington and working in the group $\mathrm{PGL}_2(\mathbf{Q}(\sqrt{2}))$, the author intends to study the simplest octic fields. Namely, using the matrix $\begin{pmatrix} 1+\sqrt{2} & -1 \\ 1 & 1+\sqrt{2} \end{pmatrix}$, he constructs a family of octic polynomials and selects a subfamily such that the generating fields are totally real cyclic octic fields.

Studying these fields, he also finds a system of independent units such that the index for a system of fundamental units has a uniform upper bound. Moreover, via the Brauer-Siegel theorem, he estimates the class numbers of these octic fields.

Reviewed by [H. Yokoi](#)

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