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Unit groups and class numbers of real cyclic octic fields.

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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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