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**F. Chemotti** ([chemotti@math.wisc.edu](mailto:chemotti@math.wisc.edu)), Department of Mathematics, University of Wisconsin, 480 Lincoln Drive, Madison, WI 53706-1388, **J. Mináč** ([minac@uwo.ca](mailto:minac@uwo.ca)), Department of Mathematics, Middlesex College, University of Western Ontario, London, Ontario N6A 5B7, Canada, and **J. Swallow\*** ([joswallow@davidson.edu](mailto:joswallow@davidson.edu)), Department of Mathematics, Davidson College, Box 7046, Davidson, NC. *Galois module structure of square classes in Klein 4-group extensions.*

Let  $G$  be the Klein 4-group. For a Galois extension  $E/F$  of fields with  $\text{Gal}(E/F) \simeq G$  we consider the  $\mathbb{F}_2\text{Gal}(E/F)$ -module  $J(E/F)$  of square classes of units of  $E$ . We determine the structure of  $J(E/F)$  in terms of arithmetic invariants of  $E/F$ , and we show that only finitely many indecomposable  $\mathbb{F}_2G$ -modules may appear as summands. We also determine the structure of  $E/\wp(E)$  in characteristic 2 and show that only two indecomposable  $\mathbb{F}_2G$ -modules appear as summands. (Received July 24, 2006)