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Title: On the 2-groups whose abelianizations are of type $(2, 4)$ and applications

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Let G be a metabelian 2-group satisfying the condition $G/G' \simeq \mathbb{Z}/2\mathbb{Z} \times \mathbb{Z}/4\mathbb{Z}$. In this paper, we give necessary and sufficient conditions for G to be metacyclic. We then apply these results to algebraic number fields \mathbf{k} to study the capitulation of their 2-ideal classes of type $(2, 4)$. Particular examples are given to illustrate how these results can be applied to real quadratic and imaginary biquadratic number fields.

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