Necessary and Sufficient Conditions for the Central Norm to Equal $2^h$ in the Simple Continued Fraction Expansion of $\sqrt{2^hc}$ for Any Odd $c > 1$

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Abstract. We look at the simple continued fraction expansion of $\sqrt{D}$ for any $D = 2^hc$ where $c > 1$ is odd with a goal of determining necessary and sufficient conditions for the central norm (as determined by the infrastructure of the underlying real quadratic order therein) to be $2^h$. At the end of the paper, we also address the case where $D = c$ is odd and the central norm of $\sqrt{D}$ is equal to 2.