VERMA MODULES OVER A $\mathbb{Z}_2 \otimes \mathbb{Z}_2$ GRADED SUPERALGEBRA AND INVARIANT DIFFERENTIAL EQUATIONS

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ABSTRACT. Lowest weight representations of the $\mathbb{Z}_2 \otimes \mathbb{Z}_2$ graded superalgebra introduced by Rittenberg and Wyler are investigated. We give a explicit construction of Verma modules over the $\mathbb{Z}_2 \otimes \mathbb{Z}_2$ graded superalgebra and show their reducibility by using singular vectors. The explicit formula of singular vectors are given and are used to derive partial differential equations invariant under the color supergroup generated by the $\mathbb{Z}_2 \otimes \mathbb{Z}_2$ graded superalgebra.