

Introduction to supergravity 2015: Exercise 7.

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Our superspace conventions are found in [1]. The components of the chiral superfield

$$\bar{\mathcal{D}}_{\dot{\alpha}}\Phi = 0 \tag{1}$$

are defined as

$$\begin{aligned} \Phi| &= A \\ \frac{1}{\sqrt{2}}\mathcal{D}_{\alpha}\Phi| &= \chi_{\alpha} \\ -\frac{1}{4}\mathcal{D}^2\Phi| &= F. \end{aligned} \tag{2}$$

Calculate

$$\mathcal{D}^{\alpha}\mathcal{D}_{\alpha}\bar{\mathcal{D}}_{\dot{\alpha}}\bar{\mathcal{D}}^{\dot{\alpha}}\bar{\Phi}|. \tag{3}$$

You will need to make use of

$$(\mathcal{D}_C\mathcal{D}_B - (-1)^{|B||C|}\mathcal{D}_B\mathcal{D}_C)V^A = -\mathcal{T}_{CB}{}^D\mathcal{D}_D V^A + (-1)^{|D|(|B|+|C|)}V^D\mathcal{R}_{CBD}{}^A. \tag{4}$$

References

- [1] J. Wess and J. Bagger, “Supersymmetry and supergravity,” Princeton, USA: Univ. Pr. (1992) 259 p