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Erratum

Conformally Invariant Differential Operators on Minkowski Space and their Curved Analogues

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There is an error on page 223 where it is claimed that "any conformally invariant formula involving algebraic combinations of the Levi Civita connection and curvature correction terms remains invariant if the fields also have values in some vector bundle with connection." This is true if the conformal invariance does not involve commuting derivatives but for the operator

$$Lf \equiv \nabla_b[\nabla^b\nabla^a - 2R^{ab} + \tfrac{2}{3}Rg^{ab}]\nabla_a f$$

on p. 222, a conformal rescaling of the metric gives

$$\hat{L}f = Lf + 2\Upsilon^b\nabla^a[\nabla_a\nabla_b - \nabla_b\nabla_a]f + 2[\nabla_a\nabla_b - \nabla_b\nabla_a](\Upsilon^b\nabla^a f).$$

Thus, if f is a function, then $\hat{L}f = Lf$ but if f is a local twistor field, then the extra terms involve Weyl curvature. Hence, the suggested *curved translation principle* fails if one starts with the operator L. We are grateful to C. R. Graham and L. J. Mason for pointing out this error.

The curved translation principle is fine except for this error. One may therefore conclude that all the invariant operators on Minkowski space admit curved analogues save for

$$(a, b \mid c, d) \to (c+2, d+2 \mid a-2, b-2)$$

in case $a \leq b \leq c \leq d$ and $(a, b \mid c, d) \neq (0, 0 \mid 0, 0)$. We think it unlikely that any of these operators admit curved analogies and, indeed, Graham [2] has shown that the cube of the Laplacian: $(0, 0 \mid 1, 1) \to (3, 3 \mid -2, -2)$ has no curved analogue. We anticipate that this phenomenon occurs in all even dimensions with the operators of [1] taking the place of L.

References

1. Graham, C.R., Jenne, R., Mason, L.J., Sparling, G.A.J.: Conformally invariant powers of the Laplacian. I. Existence. J. London Math. Soc. (to appear)
2. Graham, C.R.: Conformally invariant powers of the Laplacian. II. Nonexistence. J. London Math. Soc. (to appear)

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