

Series 2

I. Infinitesimal generators

1. Work out the infinitesimal generator starting from the finite form of the scale transformation,

$$x'^{\mu} = \alpha x^{\mu}. \quad (1)$$

2. Work out the infinitesimal generator starting from the finite form of the SCT,

$$x'^{\mu} = \frac{x^{\mu} - b^{\mu} \vec{x}^2}{1 - 2\vec{b} \cdot \vec{x} + b^2 \vec{x}^2}. \quad (2)$$

II. Scale factor of the SCT

Work out explicitly the scale factor $\Lambda(x)$ of the SCT given in eq. (2).

III. Commutation rules of the conformal algebra.

Verify explicitly the commutation rules of the generators of the conformal algebra involving the new generators D and K_{μ} as given in the lecture.