442 Tutorial Sheet 9[1]

18 April 2005

These problems ask you to work with the Kaluza-Klein theory with an ansatz for part of the four-dimensional metric. You are not asked to show it is physically consistient to set this part of metric equal to the Minkowski metric and, in fact, this can only actually be done approximately.

1. (4) Work out the geodesic equations for Kaluza-Klein theory with $\tilde{g}_{\mu\nu} \approx \eta_{\mu\nu}$ where

$$ds^2 = \phi(dx^5 + A_\mu dx^\mu)^2 + \tilde{g}_{\mu\nu} dx^\mu dx^\nu \tag{1}$$

2. (4) Work out the vacuum Einstein equations for this case.

[1]Conor Houghton, houghton@maths.tcd.ie, see also http://www.maths.tcd.ie/~houghton/442.html