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An electrostatic potential in curved spaces

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Following Whittaker(*Proc.Roy.Soc.A***116**,720(1927)) we derive the partial differential equation whose solution is the electrostatic potential in curved spaces with the metric given :

a.in 2 + 1 dimensions by i)S.Deser,R.Jackiw and G.'tHooft,*Ann.Phys.***152**,220(1984) and G.Clement,*Int.J.Theor.Phys.***24**,267(1985)and by ii)M.Banados,C.Teitelboim and J.Zanelli,*Phys.Rev.Lett.***69**,1849(1992) and

b.in 3 + 1 dimensions by C.S.Trendafilova and S.Fulling,*Eur.J.Phys.***32**,1663(2011)

With an exact solution to the partial differential equation as the objective,the telling interest here is the contrast between the resulting partial differential equations in 3 + 1 dimensions from the use of the Schwarzschild metric -and this was dealt with in detail by Whittaker(see eq.(25) et seq. in the reference cited) -versus the cylindrically symmetric metric given by Trendafilova and Fulling in item b. above

Finally, in the planar case an exact form for the electrostatic potential seems less accessible for the Banados-Teitelboim-Zanelli metric relative to the Deser-Jackiw-'tHooft and Clement solution.

Summary

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