

Stress-energy tensor on global anti-de Sitter space-time with Robin boundary conditions

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We study the renormalised stress-energy tensor (RSET) for a massless, conformally coupled scalar field on four dimensional anti-de Sitter space-time (adS₄). As adS₄ is not a globally hyperbolic space-time, we impose boundary conditions on the space-time boundary to have a well posed quantum field theory. We use Dirichlet, Neumann and Robin (mixed) boundary conditions applied to the scalar field and compute both the vacuum (v.e.v.) and thermal (t.e.v.) expectation values of the RSET. When either Dirichlet or Neumann boundary conditions are applied, the v.e.v of the RSET is a multiple of the space-time metric. Applying Robin boundary conditions break the underlying symmetry seen with the vacuum state, and results in a RSET that varies with the space-time position. However, for all Robin boundary conditions, both the v.e.v and t.e.v. converge, at the space-time boundary, to the common v.e.v.s seen when either Dirichlet or Neumann boundary conditions are applied.

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