Mathematical Physics

Alternative construction of the closed form of the Green's function for the wavized Maxwell fish-eye problem

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In the recent paper [J.\ Phys.\ A 44 (2011) 065203], we have arrived at the closed-form expression for the Green's function for the partial differential operator describing propagation of a scalar wave in an N-dimensional ($N\geqslant2$) Maxwell fish-eye medium. The derivation has been based on unique transformation properties of the fish-eye wave equation under the hyperspherical inversion. In this communication, we arrive at the same expression for the fish-eye Green's function following a different route. The alternative derivation we present here exploits the fact that there is a close mathematical relationship, through the stereographic projection, between the wavized fish-eye problem in $\mathbb{R}^{N}$ and the problem of propagation of scalar waves over the surface of the N-dimensional hypersphere.

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