Reaction forces on a relativistic point charge moving above a dielectric or a metallic half-space

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We investigate the forces that act on a particle as it moves at a height h above a half-space of dielectric or lossy material. The expressions for the longitudinal and transverse forces are calculated numerically and analytic expressions are presented for limit cases. In a *dielectric* it is shown that the longitudinal force is zero at velocities below the Cherenkov velocity and it reaches a constant value at high energies. The transverse force below the Cherenkov velocity is the result of a superposition of evanescent waves only; in this regime it increases with the momentum. Above the Cherenkov velocity propagating waves add their contribution to the transverse force. For relatively low energies their contribution tends to increase the total force. At high energies the total transverse force decays as $1/\gamma$. In the case of a *metallic* medium (σ), the longitudinal force is proportional to $\sqrt{(\gamma\beta)^3/\sigma\eta_0 h}$ when this quantity is smaller than unity and it reaches a constant value when this parameter is much larger than unity. The transverse attraction force decreases monotonically with the relativistic factor γ. [S1063-651X(98)04205-6]

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