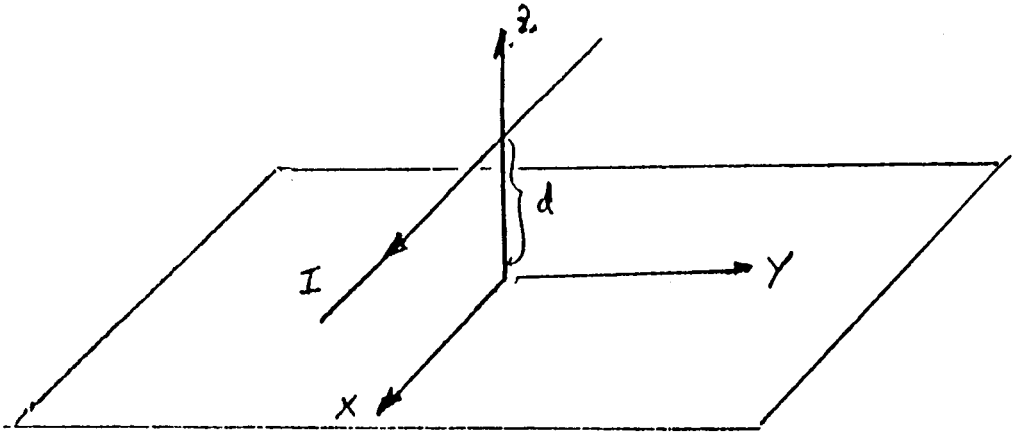
EM7a1195A

A current of magnitude I flows along an infinitely long wire in the x direction a distance d above the plane surface of a superconductor placed at z = 0. For the purpose of this question, a superconductor has the following properties: no magnetic field can exist inside the superconductor (Meissner effect), and the normal component of **B** vanishes on the boundary of the superconductor. You may use any units you wish, but you must use them consistently and state them explicitly.



(a) Compute the **B** field in the region z > 0.

(b) Determine the direction and the magnitude of the surface current density induced on the boundary, as a function of y.

(c) Find the total induced current.