The governing equations are



Since  is divergence free, it can be written as , where



Then  and  both satisfy the Helmholtz equation



Magnetic vector potential and magnetic flux density can be expressed as  and .





Taking the Fourier transform and the inverse transform





The governing equation becomes



The potentials in the three regions are



Leading to the magnetic flux density components



The interface conditions between region 0 and 1 are



The interface conditions between region 1 and 2 are



The interface conditions yield the following system of linear equations for the unknown coefficients



The solution of the system in terms of  is



We can now obtain the final expressions for the potential, in particular for region 1





The magnetic vector potential in region 1 is thus

