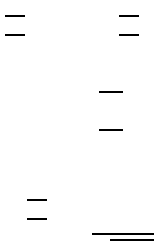
derivation for the potential of a point charge above thin layer of uniform dielectric above an anisotropic substrate bulk material

using the furrier transform

apply boundary conditions as and as

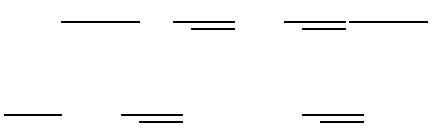
applying the conditions ,

and , ,

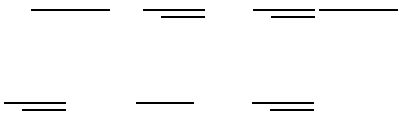


let

1+2



1-2

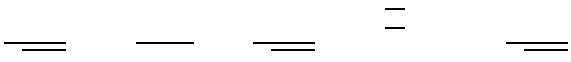


3+4

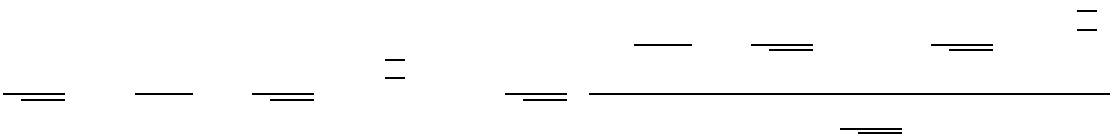
3-4

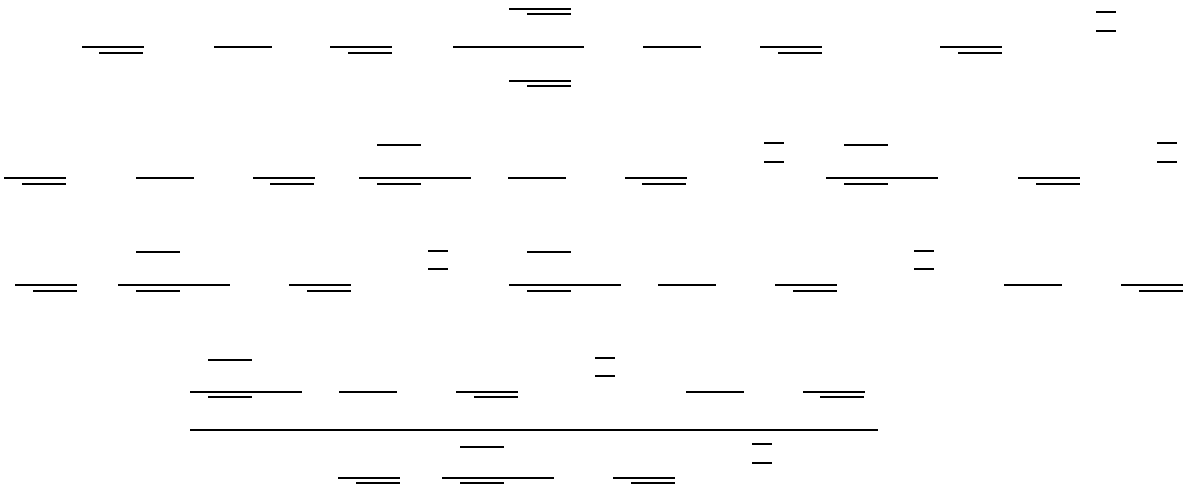
sub 5 in to 7

sub 6 in to 8

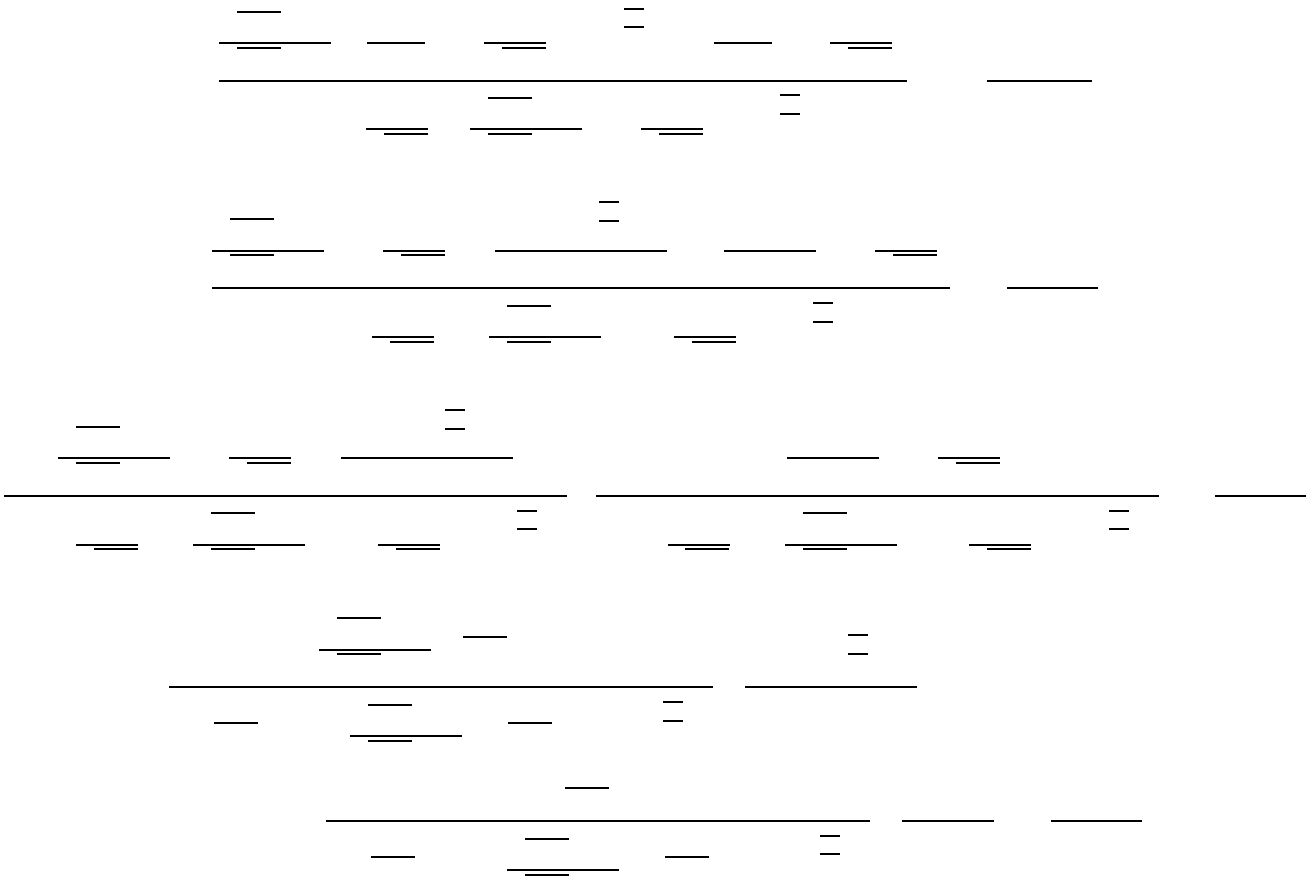


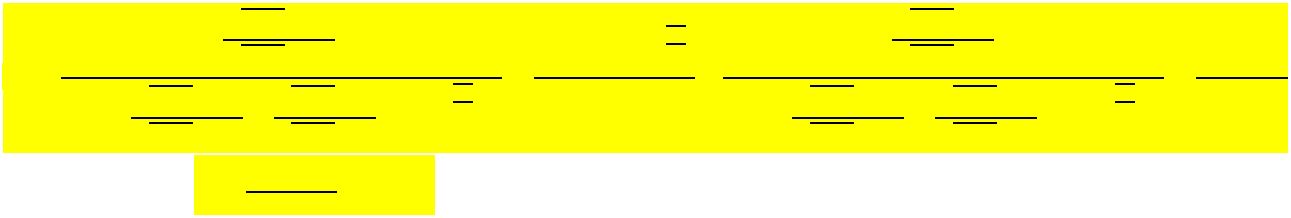
sub 9 in to 10





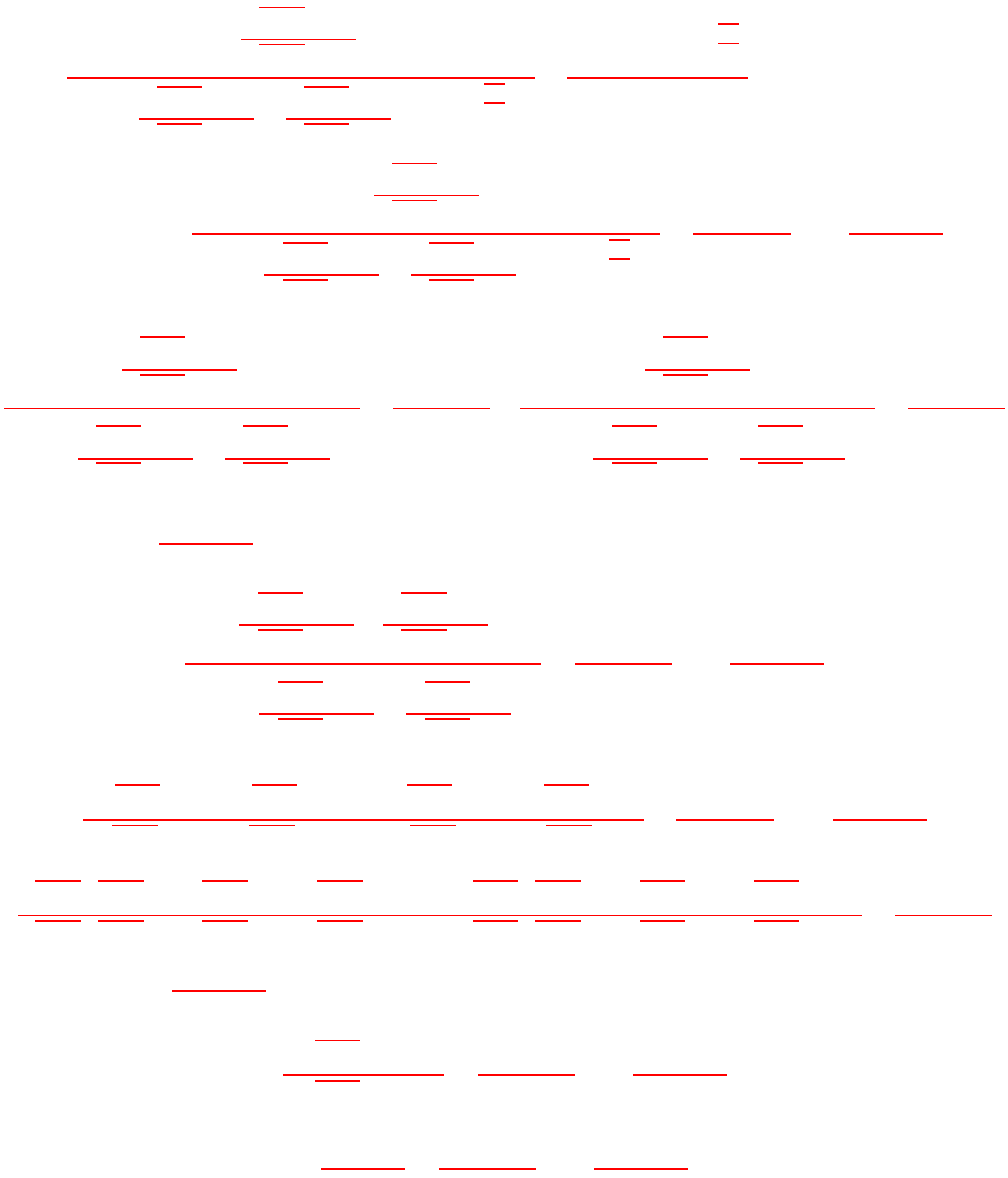
sub 11 in to





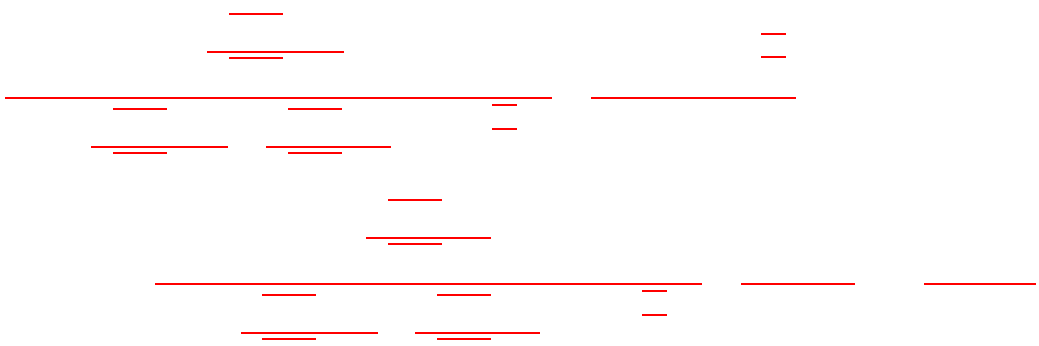
test cases

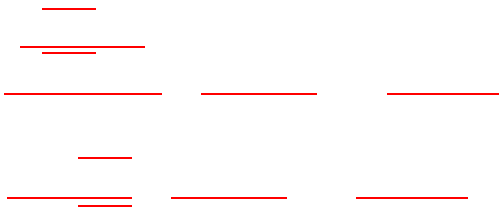
let



returns expected results

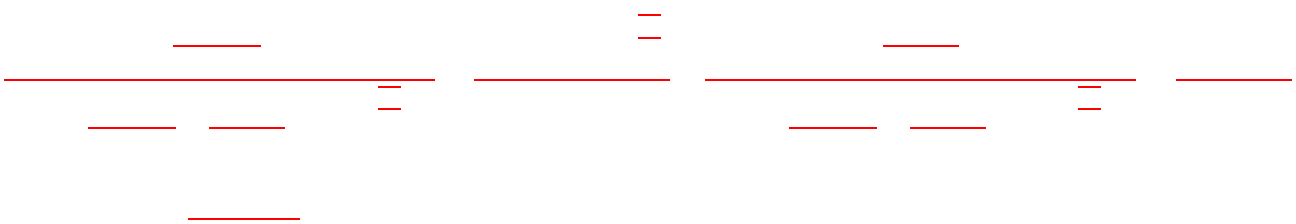
let

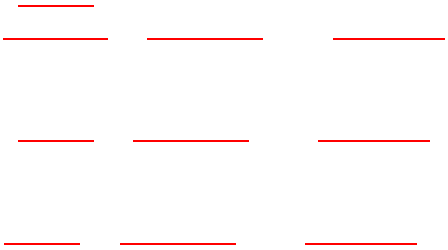




returns expected results

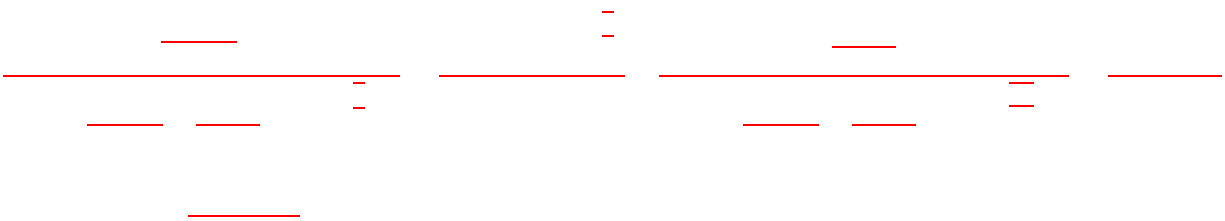
let



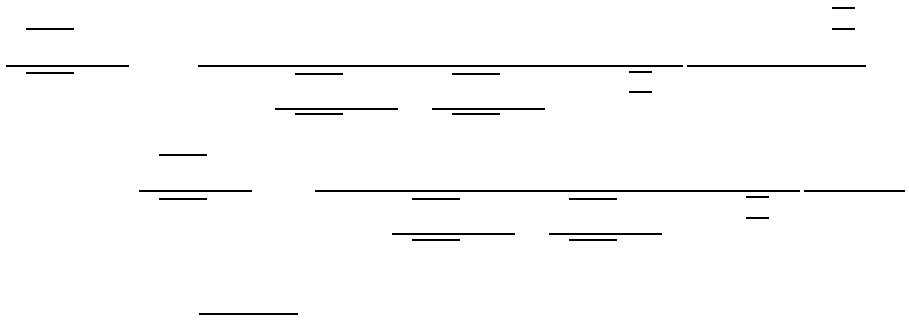


returns expected results

let

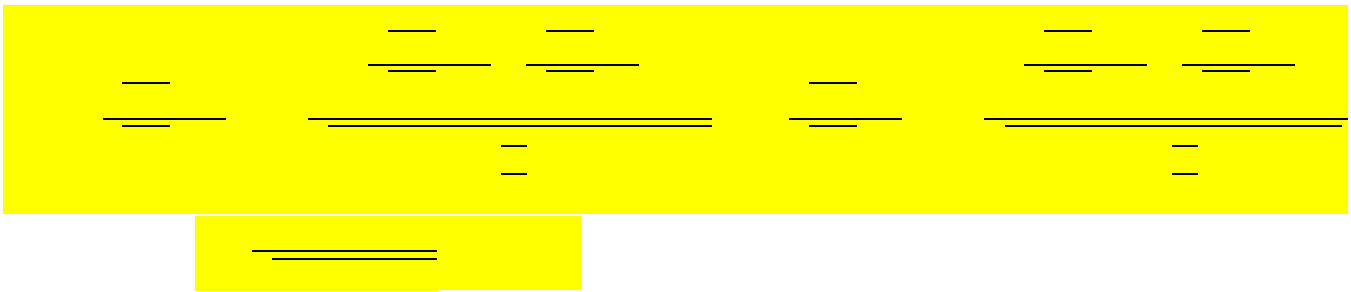


giving

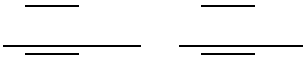


as

then

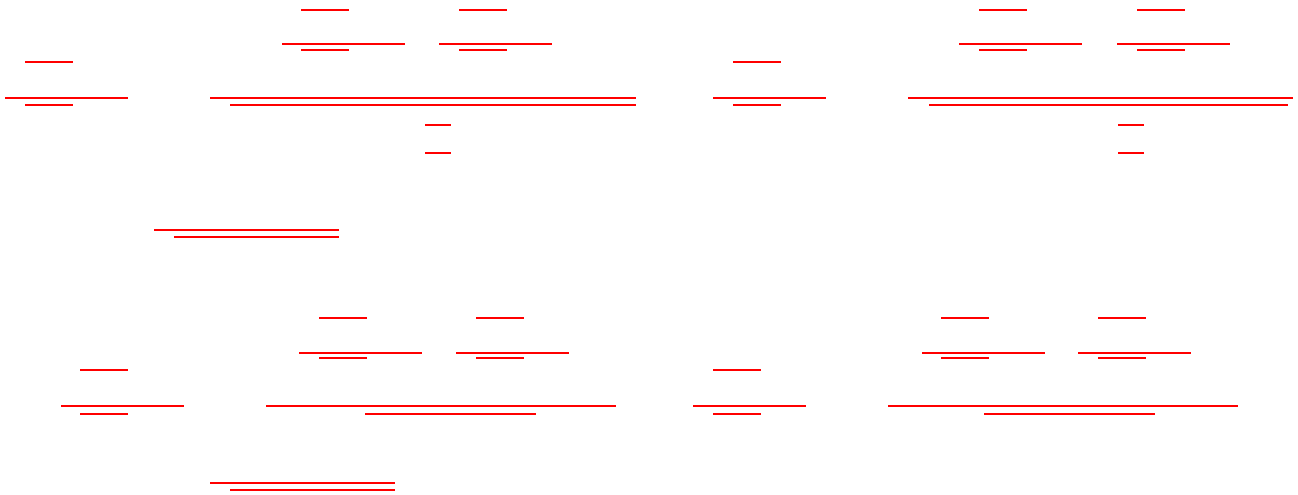


where

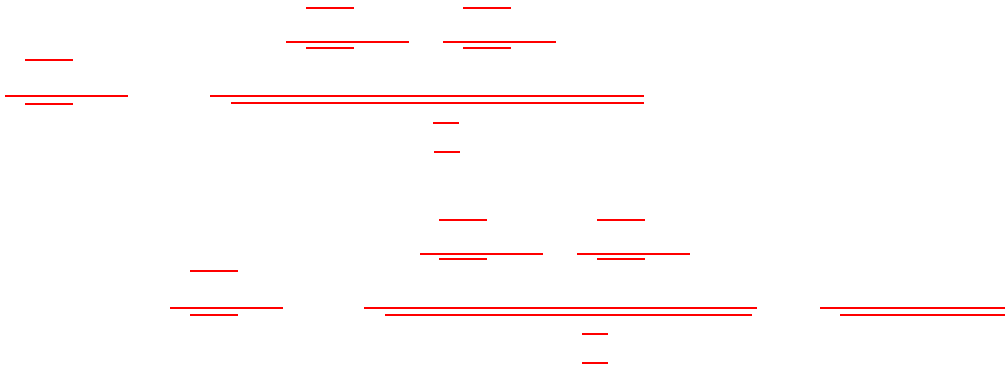


trivial cases:

h=0



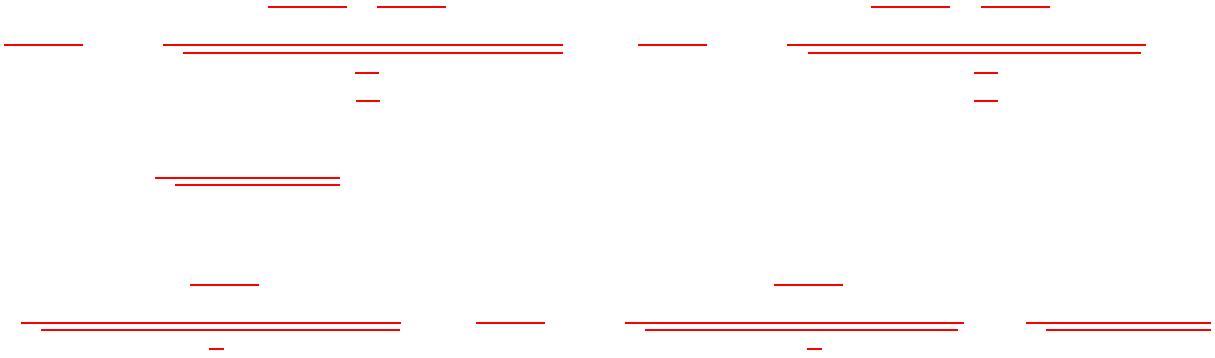
let



when using the case of k=0

returns expected results

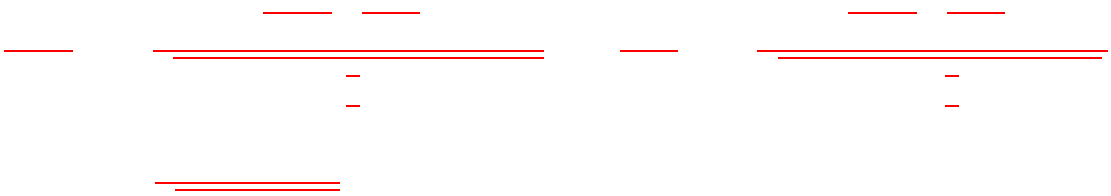
let



take case where k=0 as otherwise =0

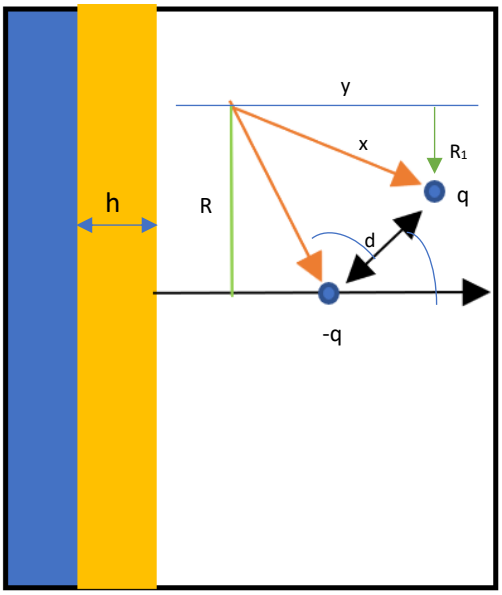
returns expected results

let



returns expected results

Dipole approximation using the principle of superposition



where

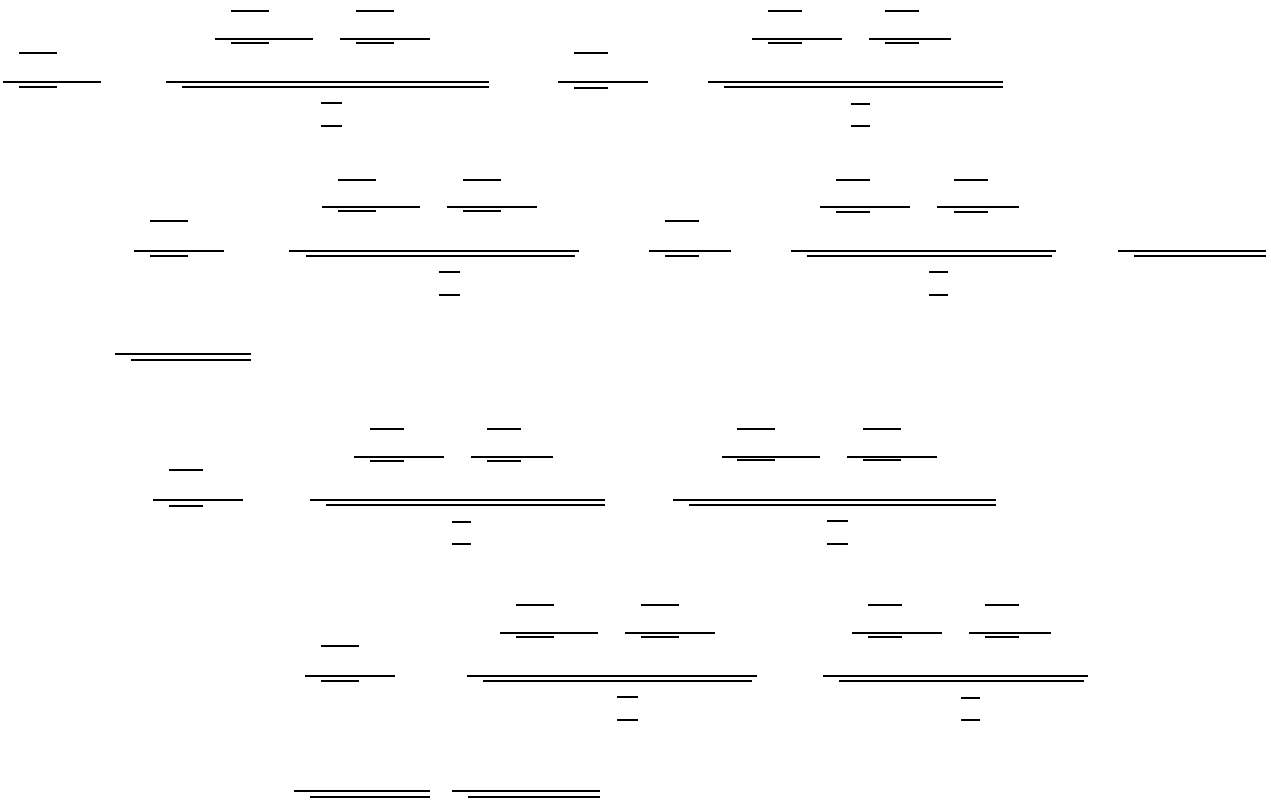
as then

let

first particle

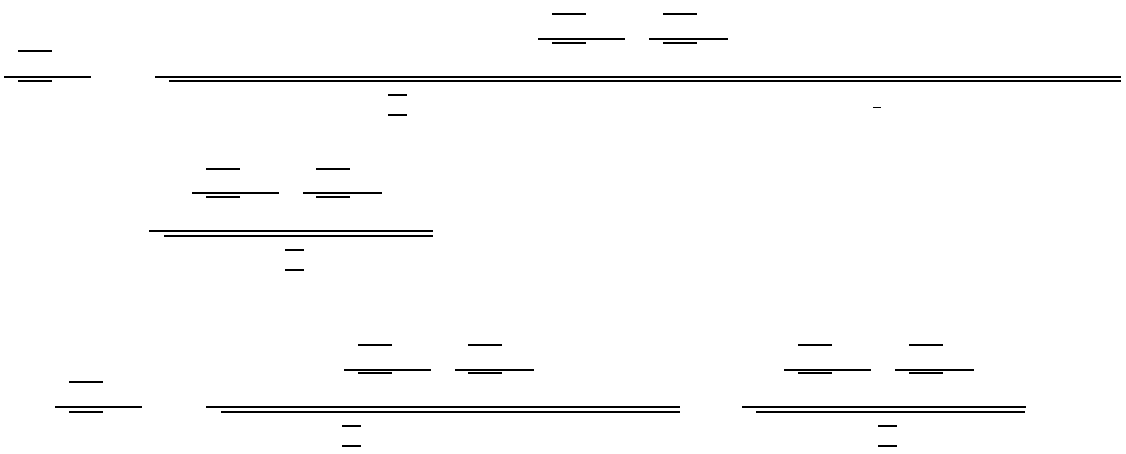
second particle

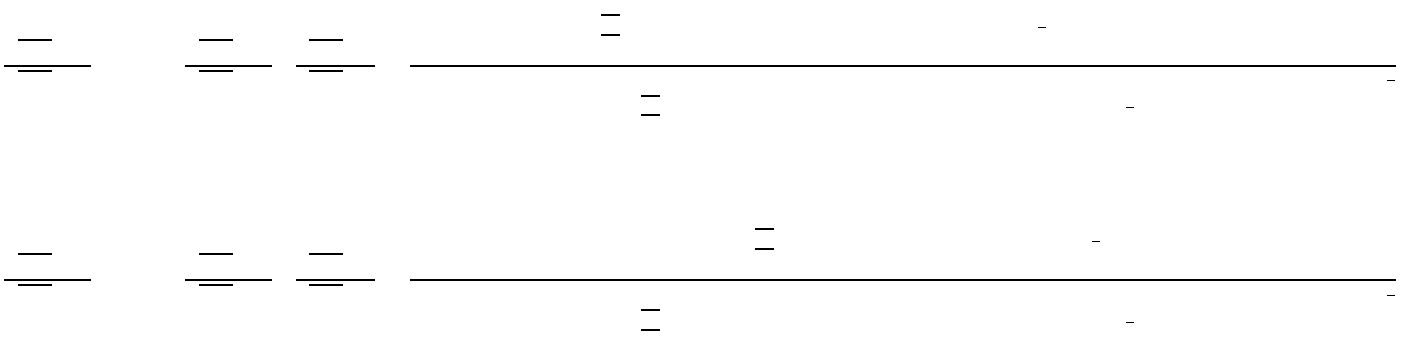
using the principle of superposition

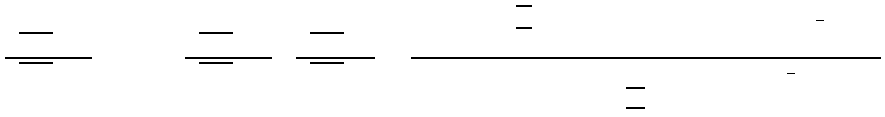


using Taylor expansion where , and and grater orders are ignored.

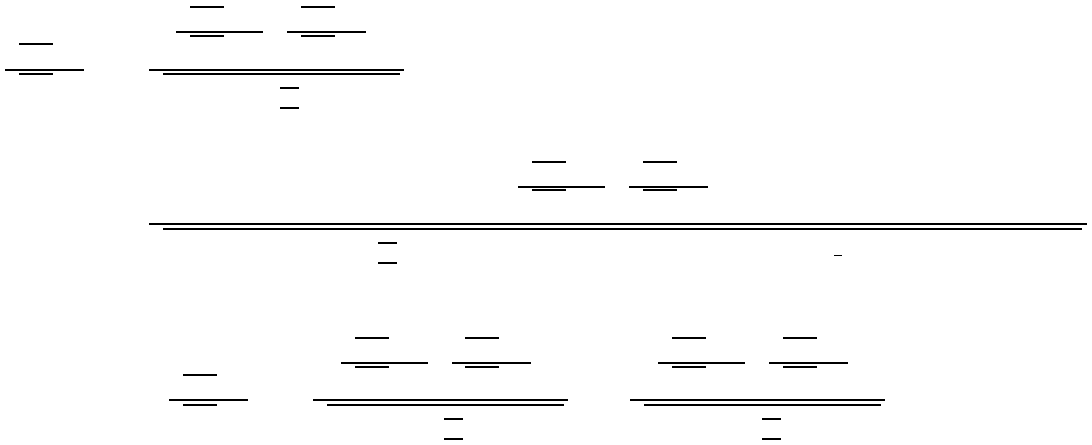
first term



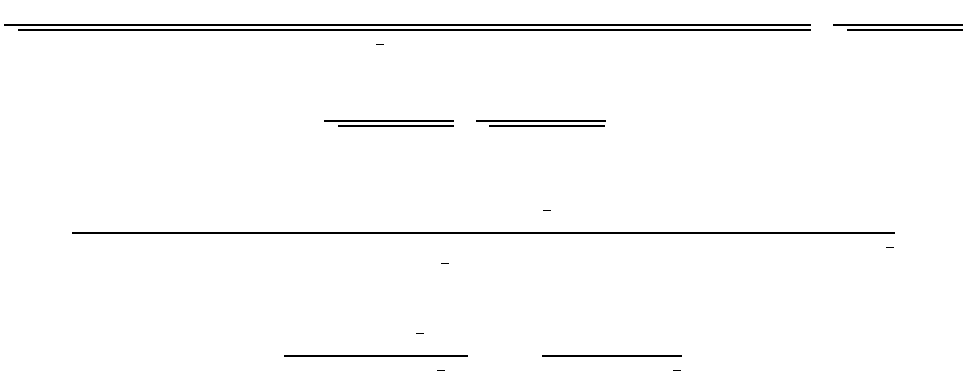




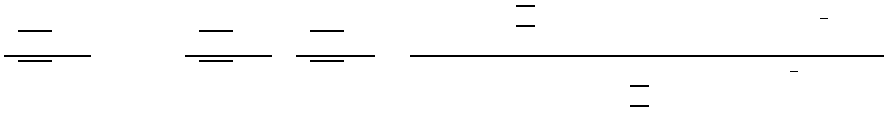
second term

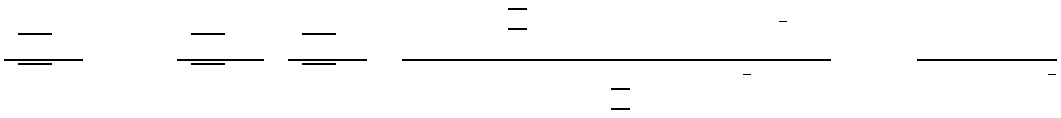


third term

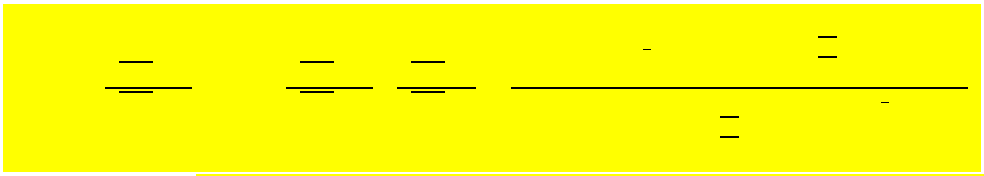


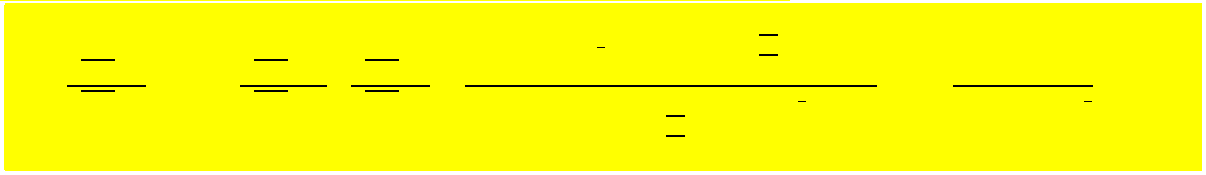
there for





as



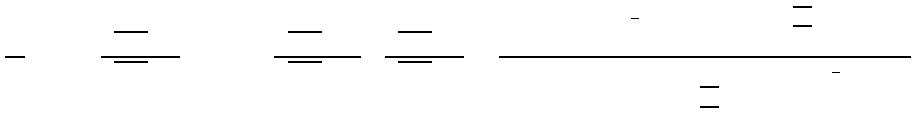


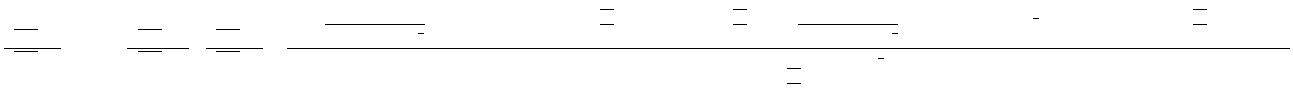
test cases

let

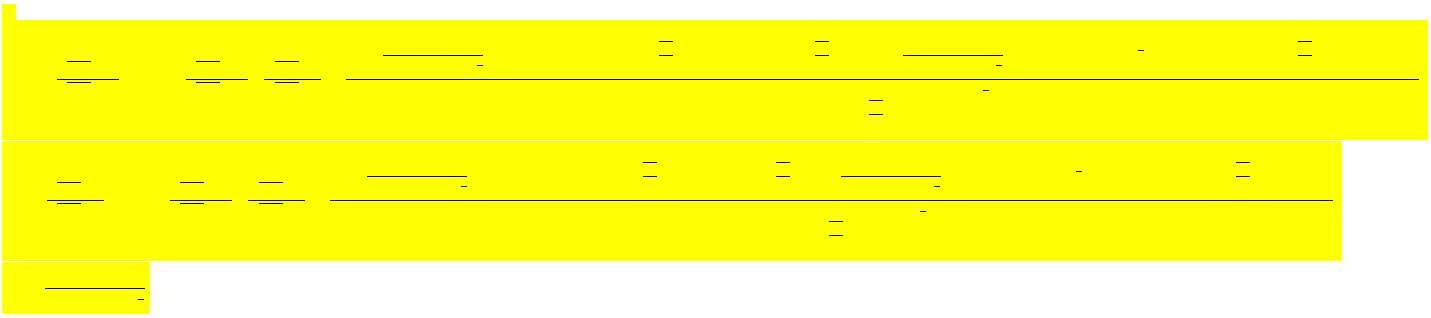
taking the case where k=0

second term

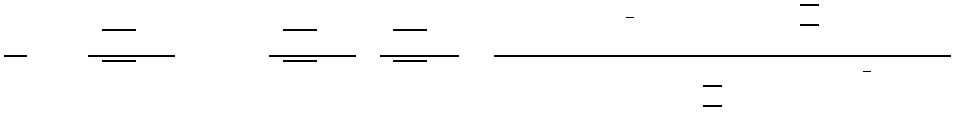


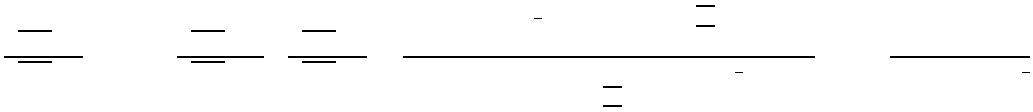


third term

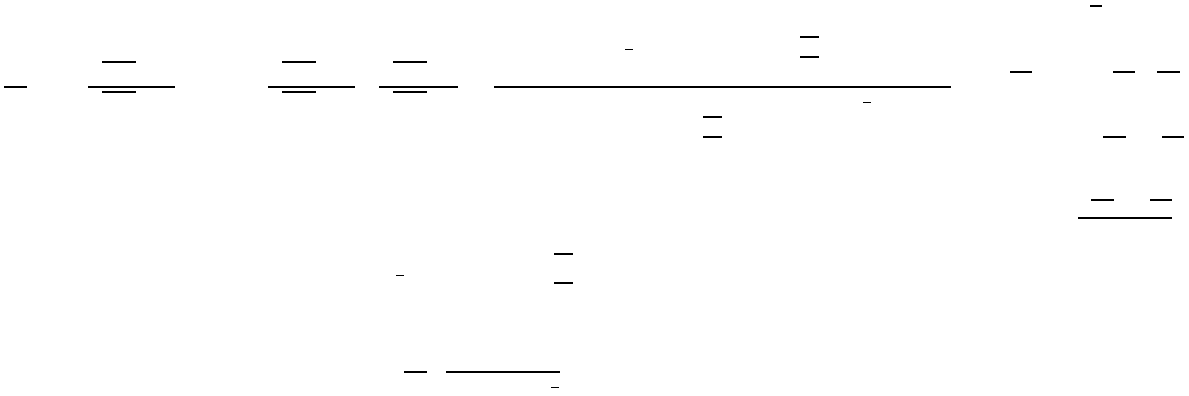


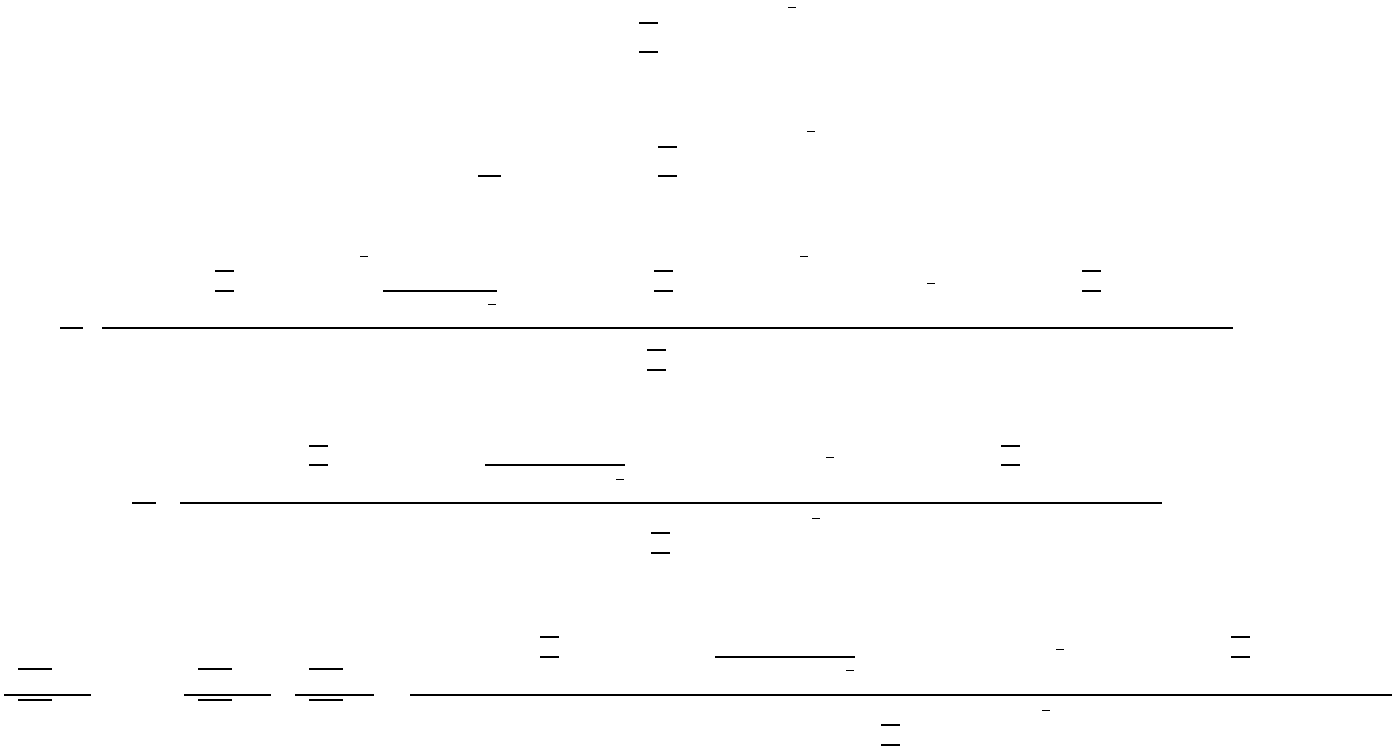
calculating



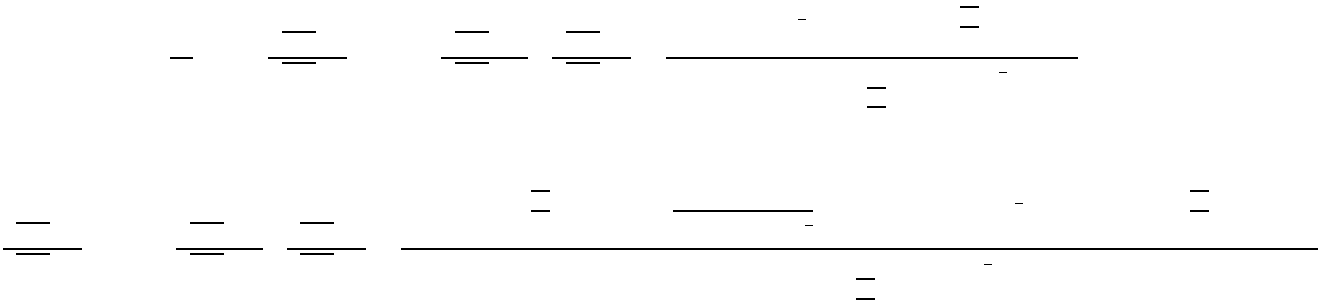


first term

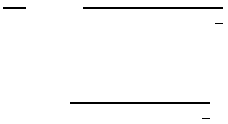




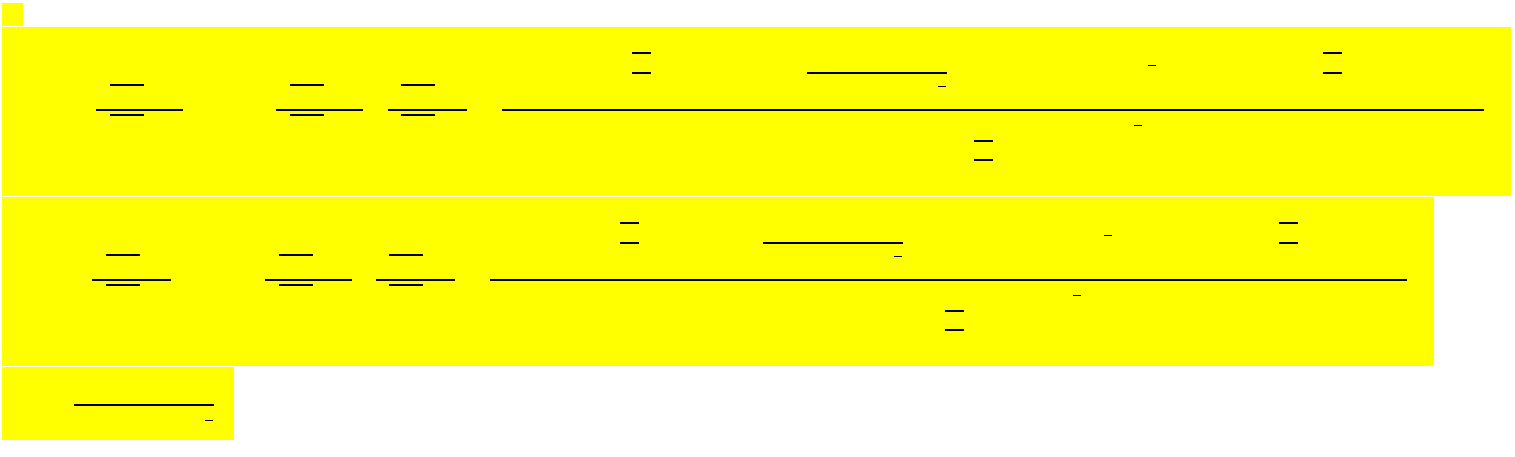
second term



third term



therefore



perpendicular and parallel components

and