4,1 Radiance in Transparent Media

We take up first the simplest case in which the canonical equation of transfer can occur: transparent optical

 media. A transparent optical medium .x is one in which

a(x,t) o and a(x;C' ;&) = o for every x in x and V X in W An example of a transparent optical medium is a block of glass which does not appreciably absorb or scatter radiant energy. Under these conditions, the integral equation of transfer (2) of Sec. 3.15 associated with a path G a $_r$(x , 0 in a vacuum takes the form:

N(z,&) N(x,g) tl) Where z = x + fir. This instance of the equation of transfer is clearly interpretable also as an instance of the radiance invariance law (2) of Sec. 2.6.

In the case of a transparent optical medium in which the index of refraction varies with location along ~r(x, &) , the n'-law for radiance (4) of Sec. 2.6

N (z,E) /n.z (z) N(x, E) /nz (x) (2)

governs the magnitude of N (z , &) along Q$_r$ (x,~) .

The preceding two laws also can be made to follow from the appropriate integrodifferential form of the equation of transfer. This would be equation I I of Sec. 21 in Ref. t251],

which in turn is deducible from the interaction principle. Thus we would deduce from this equation that

d N.~x ~ /n 2(X) = © , r

from which follows (2). Equation (3) of Sec. 3.15 yields in particular:

a N x ~) 0 4 r

for the case of a transparent medium with constant index of refraction. From this follows (1). Clearly (4) is a special case of (3), so that (3) may be considered the basic equation for radiative transfer in transparent media.