5.5: The Equation of Transfer

The equation of transfer deals with the transfer of radiation through an atmosphere that is simultaneously absorbing, scattering and emitting.

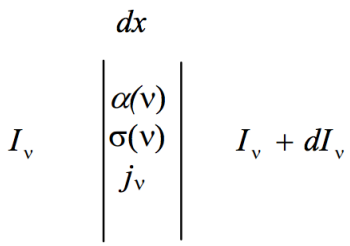

FIGURE V.1

Suppose that, between x and $x+dx$ the absorption coefficient and the scattering coefficient at frequency ν are $\alpha(\nu)$ and $\sigma(\nu)$, and the emission coefficient per unit frequency interval is $j_\nu d\nu$. In this interval, suppose that the specific intensity per unit frequency interval increases from I_ν to $I_\nu + dI_\nu$ (dI_ν might be positive or negative). The specific intensity will be reduced by absorption and scattering and increased by emission. Thus:

$$dI_\nu = -[I_\nu \alpha(\nu) + I_\nu \sigma(\nu) - j_\nu(\nu)]dx. \tag{5.5.1}$$

This is one form - the most basic form - of the *equation of transfer*. Notice that α and σ do not have a subscript.