3. page 148, Section 4.1: I now realize that I *use* and discuss the interaction principle, but that I never actually *state* the principle. I omitted an explicit statement of the principle because, as Preisendorfer (1965, p. 112) states, it is "necessarily abstract" and I was trying to spare the reader the mathematical pain associated with the principle [see *H.O.* vol II, page 205, for a mathematically rigorous statement of the principle]. However, I should have given a qualitative (even if imprecise) version of the principle, so here it is (with the key concepts italicized):

> Consider an *arbitrary region of space* (which may be a point, line, surface, or volume) in which *the laws of geometrical optics hold.* An *arbitrary incident radiance* (or irradiance, or intensity, or any other radiometric quantity) falls onto the region of space, which emits a *response radiance* (or response irradiance, etc). Then the interaction principle states: *there exists a unique set of linear (interaction) operators that connects the response radiance with the incident radiance.*

The profound significance of the interaction principle is this: *It guarantees us that if we want to find the response radiance induced by a given incident radiance falling onto a given region of space* (e.g. a particular region of a water body), *we can expend our efforts in finding the linear interaction operators for the spatial region of interest.* Once these operators are known, we then simply use them to "operate" on the given incident radiance to get the desired response radiance.

I missed a golden opportunity here to give the reader a "heads up" on how the interaction principle will be used at several places in the book, so let me do it now:

> Much of Chapter 4 is devoted to showing how to numerically estimate the four interaction operators (the radiance transfer functions) that connect incident and response radiances for a wind-blown air-water surface. Here, the arbitrary region of space mentioned above is a two-dimensional surface, and the "operation" is the integrations seen in Eqs. (4.3) and (4.4).
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> Another example of the interaction principle is seen in the path function for elastic scattering, Eq. (5.5). Here the interaction operator is the volume scattering function, which is assumed to be given, and the region of space is the point at which the scattering occurs. Although we derive Eq. (5.5) from physically based arguments, we could write it down immediately after invoking the interaction principle (but recall my comments in the third paragraph of page 236).
>
> In Chapter 7 we show how interaction operators can give the response irradiances for a finitely thick layer of water; see, for example, Eqs. (7.47) and (7.48) on page 361. Here the region of space is the (infinite) volume (layer) of water between two different depths, the interaction operators are certain reflectances and transmittances for the layer of water, and the operations are simple multiplications. We develop a set of differential equations that are easily solved for the desired operators (the Riccati equations of Section 7.8).
>
> In Chapter 8, we show how interaction operators can give us certain Fourier amplitudes of the radiance distribution (from which we can compute the desired radiance). Once again, the region of space is the layer of water between two depths. The interaction

operators are matrices composed of certain reflectance and transmittance functions for the layer of water, and matrix multiplication is the operation that converts incident radiance amplitudes into response radiance amplitudes. The operators are again obtained from Riccati differential equations. See Eqs. (8.70) and (8.71) for the appropriate form of the interaction principle, and see Eqs. (8.74)-(8.85) for the Riccati equations that give us the needed operators.

<< Back to Chapter 4