When the BSDF is due to microroughness on a surface, you can scale it to other wavelengths very easily. This technique is valid when the scattering is from a polished surface, but not when the scattering is due to contamination or dust on the surface.

The ABg BSDF model used in TracePro (and GUERAP V) has the form

$$BSDF = \frac{A}{B + \beta g}$$

where

$$\beta = |\bar{\beta} - \bar{\beta}_0|$$

To scale the ABg BSDF from one wavelength to another, say from $\lambda_1$ to $\lambda_2$, we calculate new A and B coefficients, and g remains unchanged,

$$A_2 = A_1 \left(\frac{\lambda_2}{\lambda_1}\right)^{g - 4}$$

and

$$B_2 = B_1 \left(\frac{\lambda_2}{\lambda_1}\right)^g.$$
We postulate that the PSD (and therefore the BSDF) has the form

\[ PSD = \frac{a}{b + (cf)^{\varepsilon}} \]

where a, b, and c are constants and f = spatial frequency. Noting that \( f = \frac{\beta}{\lambda} \), where

\( \beta = |\tilde{\beta} - \tilde{\beta}_0| \),

then

\[ PSD = \frac{a}{b + \left(\frac{c\beta}{\lambda}\right)^{\varepsilon}} = \frac{a \left(\frac{\lambda}{c}\right)^{\varepsilon}}{c \left(\frac{\lambda}{c}\right)^{\varepsilon} + \beta^{\varepsilon}}. \]

Using the fact that the BRDF is proportional to the PSD, after doing some algebra, we can write the BSDF as

\[ BSDF = K \frac{a \lambda^{\varepsilon-4}}{b \lambda^{\varepsilon} + \beta^{\varepsilon}} \]

where K is a constant. Letting \( a' = a/c^\varepsilon \), \( b' = b/c^\varepsilon \), we have

\[ BSDF = K' \frac{a' \lambda^{\varepsilon-4}}{b' \lambda^{\varepsilon} + \beta^{\varepsilon}}. \]

For a particular \( \lambda \), then,

\[ A = K'a' \lambda^{\varepsilon-4} \]

and

\[ B = b' \lambda^{\varepsilon}. \]

The wavelength scaling law for the ABg BSDF is now evident. To scale the ABg BSDF from \( \lambda_1 \) to \( \lambda_2 \), we calculate new A and B coefficients, and \( g \) remains unchanged,

\[ A_2 = A_1 \left(\frac{\lambda_2}{\lambda_1}\right)^{\varepsilon-4} \]

and
\[ D_2 - D_1 \left( \frac{\lambda_2}{\lambda_1} \right)^\varepsilon \]