Once the TM$^z$ and TE$^z$ strip problems have been solved for the currents, we can calculate the total field everywhere in space.

Considering the TM$^z$ scattering by a pec strip first →

$$E_z^s(\vec{r}) = -j \frac{k \eta}{\lambda} A_z(\vec{r}) = \frac{k \eta}{\lambda} \int_0^a J_z(x') H_0^{(2)}(k \rho - x') \, dx'$$  \hspace{1cm} (1)

For observation points far from the strip such that $k(\rho - x') \to \infty$, the asymptotic form of the Hankel function

$$H_0^{(2)}(z) \sim \sqrt{\frac{j z}{\pi^2} e^{-j z}}$$

with the approximations $k(\rho - x')$ : phase

$$1(\rho - x') \sim \begin{cases} \rho - x' \cos \phi & : \text{phase} \\ \rho & : \text{amplitude} \end{cases}$$

gives

$$H_0^{(2)}(k \rho - x') \sim \sqrt{\frac{j z}{\pi \kappa \rho}} e^{-j k \rho - j k x' \cos \phi}$$

Substitution in (1)

$$E_z^s(\vec{r}) \sim -\frac{k \eta}{\lambda} \sqrt{\frac{j z}{\pi \kappa \rho}} e^{-j k \rho} \int_0^a J_z(x') e^{j k x' \cos \phi} \, dx'$$  \hspace{1cm} (2)
Eqn. 2 shows how the far field can be computed by a constant times the Fourier transform of the current. Since we used a pulse expansion for the current, the Fourier transform will be a sum of phase shifted sinc functions. (No numerical integration is required.)

The above analysis can be repeated for all three Cartesian components and generalized to give the far-field

$$E^z(\vec{r}) \propto -\frac{ik}{4}\sqrt{\frac{j2}{\pi k_p}} e^{-j k_p} \int_{s'} F(s') e^{j k \cdot \vec{r}} ds'$$

$$\omega k \cdot \vec{r}' = k \cos \phi x' + k \sin \phi y'$$

which can be used for the TEz scattering problem, for example.

In the far field, $E_p \rightarrow 0$ leaving $E_z$ & $E_\phi$ non-vanishing components only, for the Z-D problem.

In a manner similar to 3-D problems, one can define a Radar Cross Section for Z-D geometries as an RCS per unit length. For Z-D problems this is referred to as an Echo Width or Z-D RCS $, \sigma_{Z-D}$. It is defined as-

The width intercepting the amount of incident power which, when radiated by cylindrical omni-directional radiation, produces at the receiver the same power density as the original target.
Mathematically: \[ \lim_{\rho \to 0} \left[ \frac{V_{2-D} P_i}{2\pi \rho} \right] = P_s \]

or

\[ V_{2-D} = \lim_{\rho \to 0} \left[ 2\pi \rho \frac{P_s}{P_i} \right] \]

The definitions of monostatic and bistatic remain the same here for 2-D as for 3-D.

In decibels:

\[ V_{2-D} = 10 \log_{10} \left\{ \lim_{\rho \to 0} 2\pi \rho \frac{P_s}{P_i} \right\} \]

in dbm or dB/\lambda.