1) Medición a 1 Puerto:

a) Puerto 1 sin calibrar:

\[ S_{11} = S_{11M} + \left[ Ed + S_{11M}\right]^2 Es + S_{11M}(1 - E_{ER}) \]

\[ S_{11M} = \frac{b_2}{a_0} \quad S_{11c} = S_{11} \text{ corregido} \]

\[ S_{11} = 0.2 \pm \left[ 0.1 + 0.2^2 \cdot 0.2 + 0.2 \right] \quad 0.20 \pm 0.13 \]

\[ S_{11} = 0.200 \pm 0.130 = -1.4 \text{ dB} + 4.4 \text{ dB} / -9.1 \text{ dB} \]

b) Puerto 1 calibrado: 0SM

\[ S_{11} = S_{11c} = \left[ Ed + S_{11c}\right]^2 Es + S_{11c}(1 - E_{ER}) \]

\[ S_{11} = 0.2 \pm \left[ 0.01 + 0.2^2 \cdot 0.016 + 0.2 \right] \quad 0.211 = -13.5 \text{ dB} \]

\[ S_{11} = 0.200 \pm 0.011 = -14.47 \text{ dB} \]
3) Medición a 2 Puertos: 1) DUT Puertos: Atenaudor 3 dB con
\[ |\Gamma_1| = |\Gamma_2| = 0.2 \]
\[ S_{\text{DUT}} = \begin{bmatrix} 0.2 & 0.707 \\ 0.707 & 0.2 \end{bmatrix} \]

VNA:

<table>
<thead>
<tr>
<th></th>
<th>Error</th>
<th>Sin corregir</th>
<th>Corregido</th>
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</thead>
<tbody>
<tr>
<td>EL</td>
<td>18 dB</td>
<td>40 dB</td>
<td></td>
</tr>
<tr>
<td>EL</td>
<td>0.126</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>

\[ |S_{\text{11}}| = |S_{\text{11c}}| + |E_d + E_s| S_{\text{12}}| S_{\text{11}}| (1 - E_{\text{Fsrc}}) \]
\[ |S_{\text{11}}| = 0.2 + \left[ 0.01 + 0.0016 \cdot 0.2^2 + 0.707 \cdot 0.707 \cdot 0.126 + 0.2 \cdot (1 - 0.9988) \right] \]
\[ = 0.2 + \left[ 0.01 + 0.04 \cdot 0.1^3 + 0.063 + 0.4 \cdot 10^{-3} \right] \]
\[ = 0.2 + 0.074 = 0.274 \]
\[ \frac{-14 \text{ dB}}{0.126 = -18.0 \text{ dB}} \]

\[ |S_{\text{11}}| = 0.200 \pm 0.074 = -14 \text{ dB} \pm 2.8 \text{ dB} = -4 \text{ dB} \]
6) TO SM (Punter 1 y 2) Full 2 - Port

\[
|S_{11}| = 0.2 \pm \left[ 0.01 + 0.016 \cdot 0.2^2 + 0.297 \cdot 0.707 \cdot 0.101 + 0.2 \right] (7 - 0.9988)
\]

\[
= 0.2 \pm \left[ 0.01 + 0.64 \cdot 10^{-3} + 0.005 + 0.9 \cdot 10^{-3} \right]
\]

\[
\approx 0.2 \pm 0.016
\]

\[
|S_{11}| = 0.200 \pm 0.016 = -14 \text{ dBA} \pm 0.7 \text{ dBA}
\]

Para variaciones pequeñas en φS_{11}, se puede aproximar que:

\[
\mu(φS_{11}) = \arccos \left( \frac{\mu/|S_{11}|}{|S_{11}|} \right)
\]