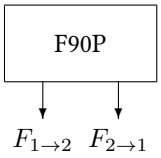
Block F90P

The F90P block calculates the radiation shape factor of two perpendicular rectangles without a common edge.





Name	F90P
Function	bs0019
Inputs	0
Outputs	2
Parameters	9
Strings	0
Group	C

Inputs

None

Outputs

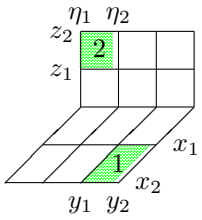
1 Radiation shape factor $F_{1\to2}$
2 Radiation shape factor $F_{2\to1}$

Parameters

1 x-coordinate displacement x_1 of area 1 (sender)
2 x_2 coordinate of area 1 (width $+x_1$)
3 y-coordinate displacement y_1 of area 1 (sender)
4 y_2 coordinate of area 1 (depth $+y_1$)
5 x-coordinate displacement x_1 of area 2 (receiver)
6 x_2 coordinate of area 2 (width $+x_1$)
7 z-coordinate displacement z_1 of area 2 (receiver)
8 z_2 coordinate of area 2 (height $+z_1$)

Strings

None



According to Howell the governing equation is

$$F_{1\to 2} = \frac{1}{2\pi(x_2 - x_1)(y_2 - y_1)} \sum_{l=1}^{2}\sum_{k=1}^{2}\sum_{j=1}^{2}\sum_{i=1}^{2}(-1)^{i+j+k+l} G(x_i, y_j, \eta_k, z_l)$$

where

$$\begin{aligned} G =& (y-\eta)\sqrt{x^2+z^2}\arctan\left(\frac{y-\eta}{\sqrt{x^2+z^2}}\right) \\ & - \frac{1}{4}\left(x^2+z^2-(y-\eta)^2\right)\ln(x^2+z^2+(y-\eta)^2) \end{aligned}$$