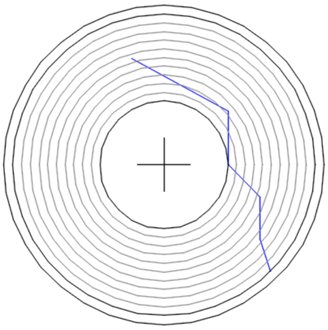
SEISMOGRAPH

Verification Examples (C1)

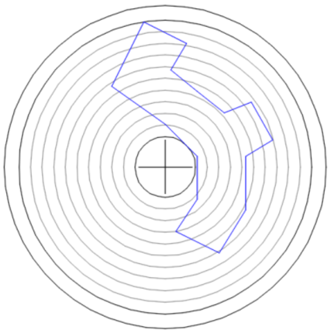
PSHA Tool: Magnitude & Distance Distribution

Example 1 – Distance Distribution: Line & Area

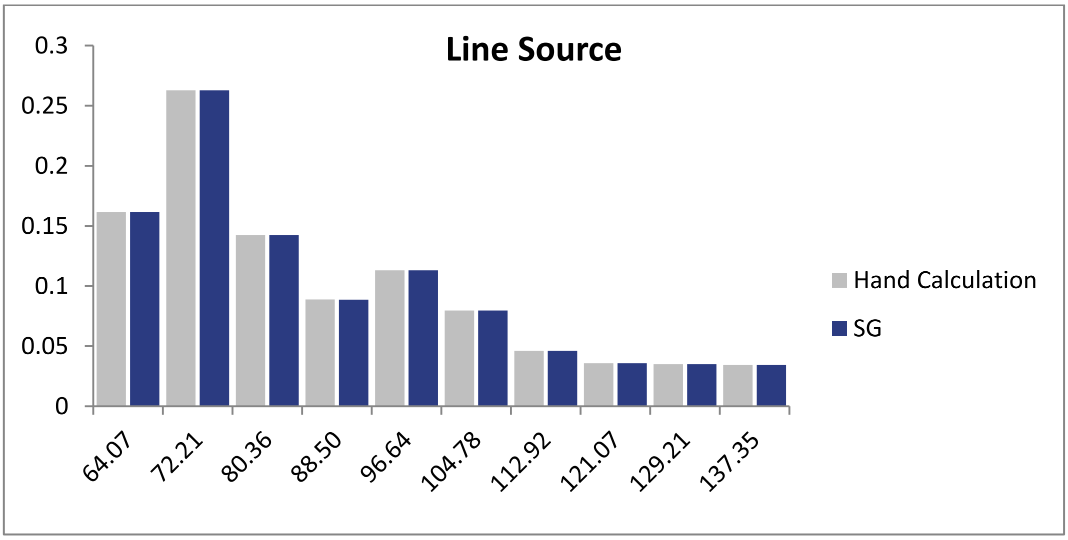
A comparison between the independent calculations and SG results.

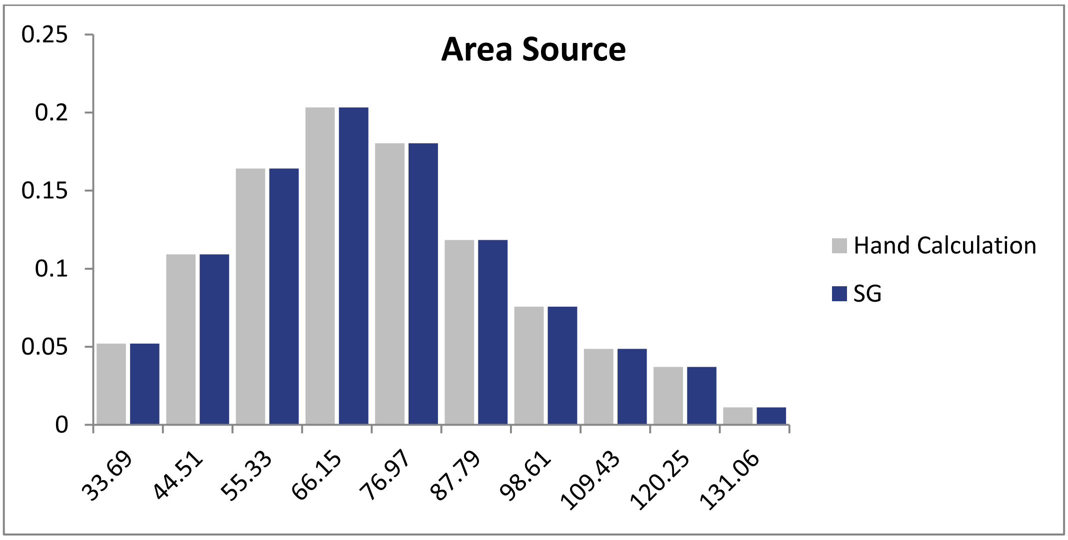


Line Source



Area Source





Example 2 – Distance Distribution

A comparison between the independent calculations [1] and SG results.

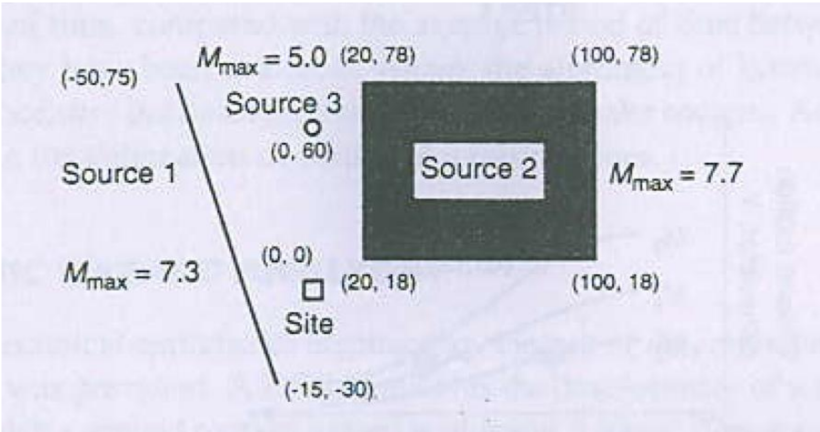
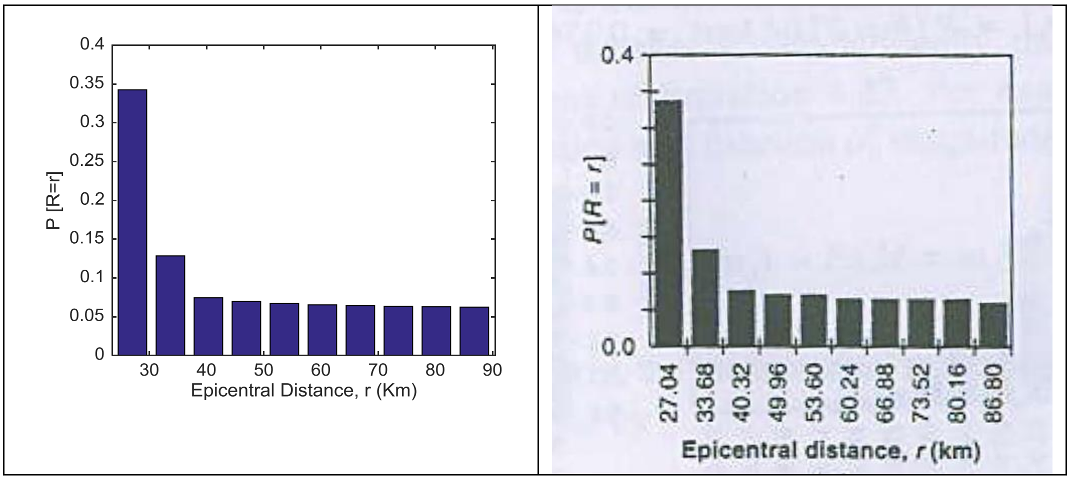
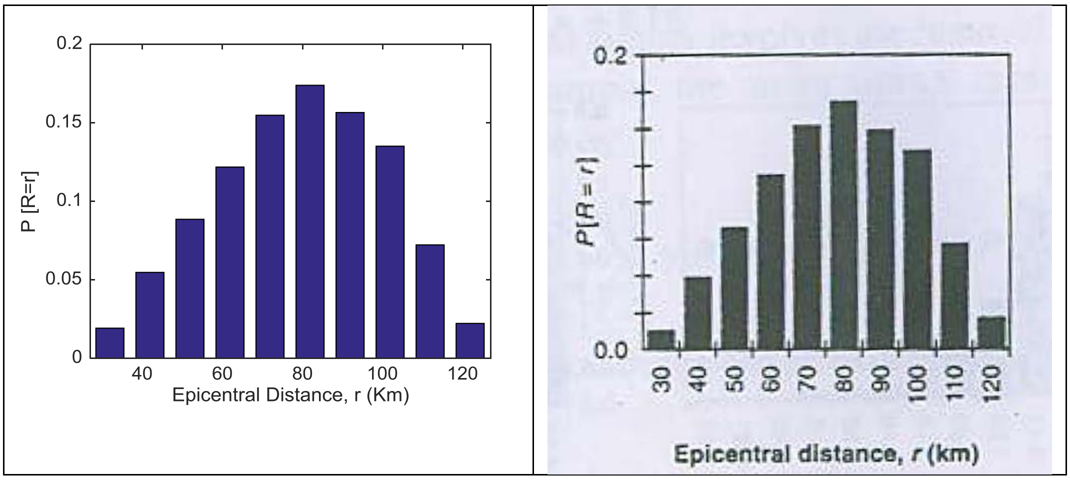


Figure E4.2

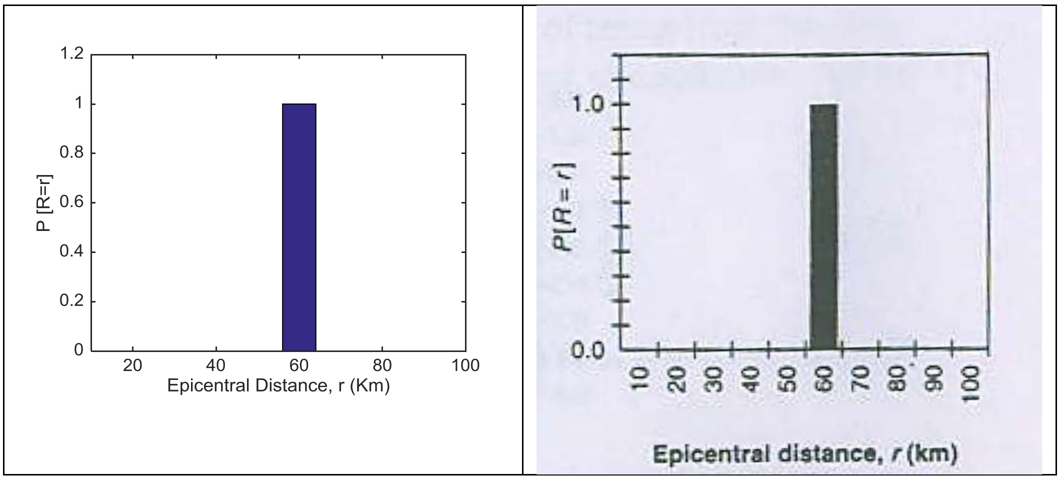
Example 4.5 from the reference [1].



Line Source: distance probability distributions from Seismograph results (left) and independent calculation from the reference [1] (right).



Area Source: distance probability distributions from Seismograph results (left) and independent calculation from the reference [1] (right).

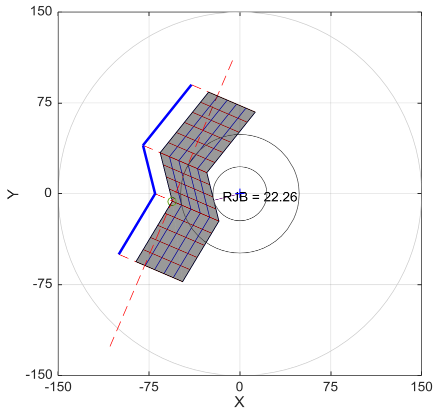


Point Source: distance probability distributions from Seismograph results (left) and independent calculation from the reference [1] (right).

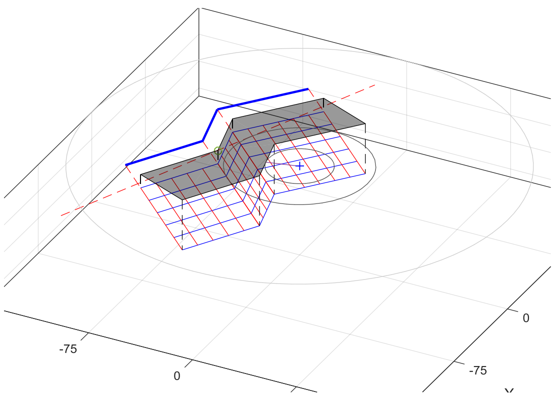
Example 3 – Distance Distribution: 3D Fault

A comparison between the independent calculations[1] and SG results.

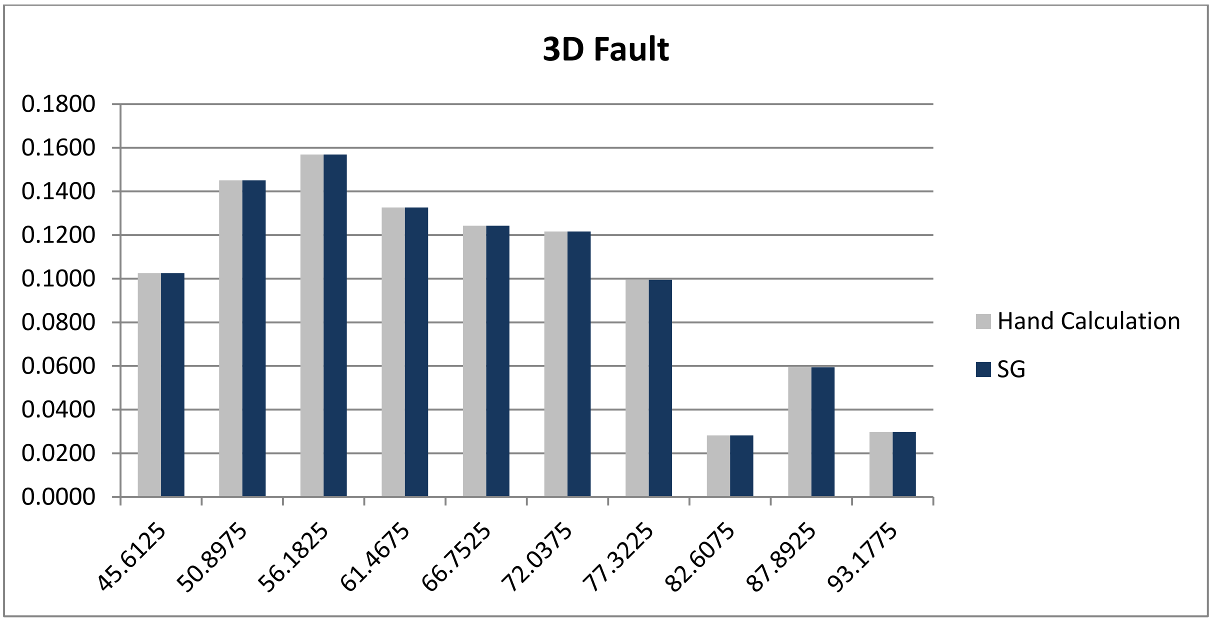
(See: *3DF.xlsx* file)



Top View



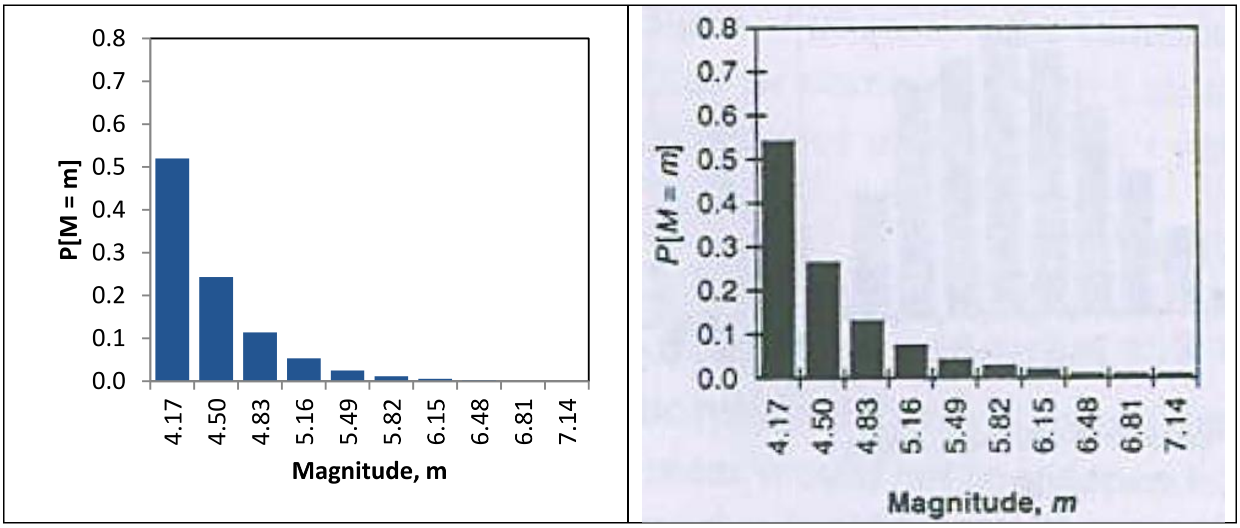
3D View



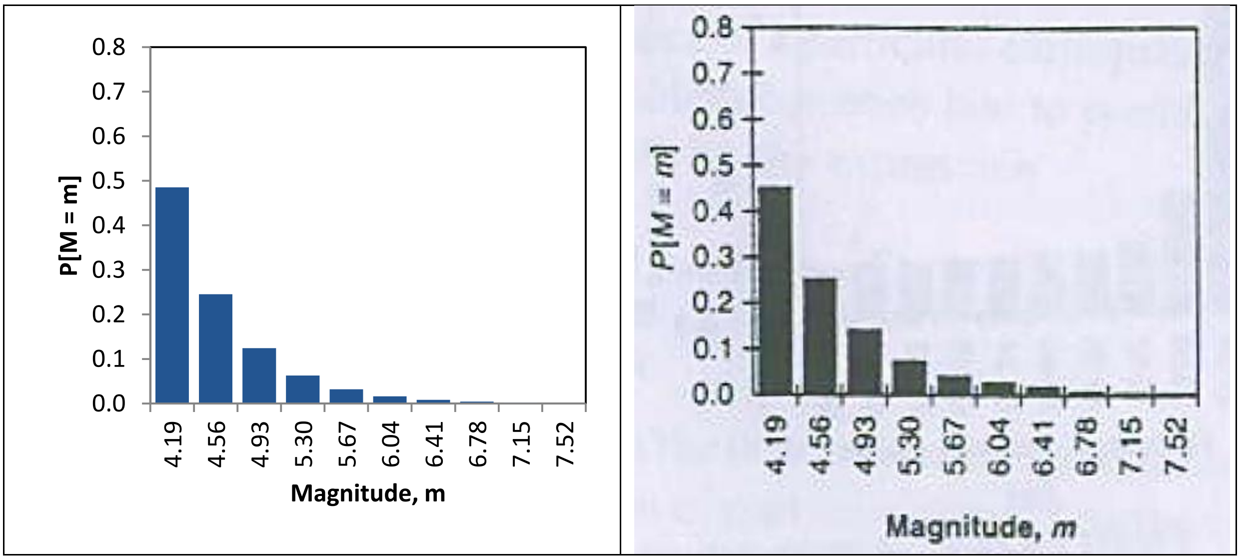
[1] Special thanks to Ali Jamali for providing the SolidWorks Drawing.

Example 4 – Magnitude Distribution

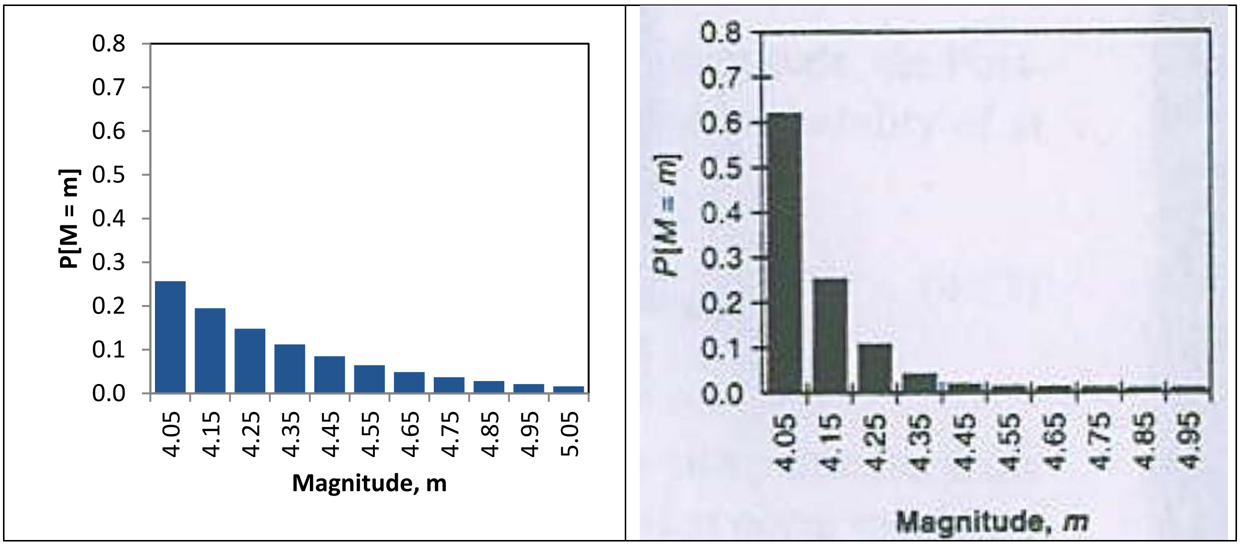
A comparison between the Seismosignal results and SG results.



Line Source: magnitude probability distributions from Seismograph results (left) and independent calculation from the reference [1] (right).



Area Source: magnitude probability distributions from Seismograph results (left) and independent calculation from the reference [1] (right).



Point Source: magnitude probability distributions from Seismograph results (left) and independent calculation from the reference [1] (right).

Calculations for the first interval $(4 < m < 4.1)$ of the magnitude probability distributions of the Point Source are as follows:

Source Zone 3: $m_0 = 4$

$m_{\max} = 5$

$\log \lambda_m = 2.7 - 1.2M$

$$f_m(m) = \frac{\beta \exp[-\beta(m - m_0)]}{1 - \exp[-\beta(m_{\max} - m_0)]}$$

$$P[m_l < m < m_u] = \int_{m=m_l}^{m=m_u} f_m(m)dm \approx f_m\left(\frac{m_u + m_l}{2}\right)(m_u - m_l)$$

$$\beta = b\ln(10) = 1.2 \times 2.3026 = 2.7631$$

$$\Delta m = 0.1 \rightarrow \begin{cases} m_l = 4 \\ m = 4.05 \\ m_u = 4.1 \end{cases}$$

$$f_m(4.05) = \frac{2.7631 \times \exp[-2.7631(4.05 - 4)]}{1 - \exp[-2.7631(5 - 4)]} = 2.5686$$

$$P[4 < m < 4.1] \approx f_m(4.05)(0.1) = 0.25686$$

REFERENCES

[1] Kramer, S.L., 1996. Geotechnical Earthquake Engineering. Prentice-Hall, New Jersey.