A single point source generates earthquakes of magnitude with a truncated exponential distribution ($M_{min} = 5$, $M_{max} = 6.5$, $\beta = \log 10$, and NM_{min}=2). Use the Sadigh et al. 1997 GMM (strike-slip) with untruncated sigma to compute the seismic hazard curve for Sa(T=0.001) at a rock site located 100 km from the hypocenter.

Evaluating Sadigh et al 1997 at T=0.001s leads to

$\ln PGA = -1.274 + 1.1m - 2.1\ln(20 + \exp(-0.485 + 0.5240m))$

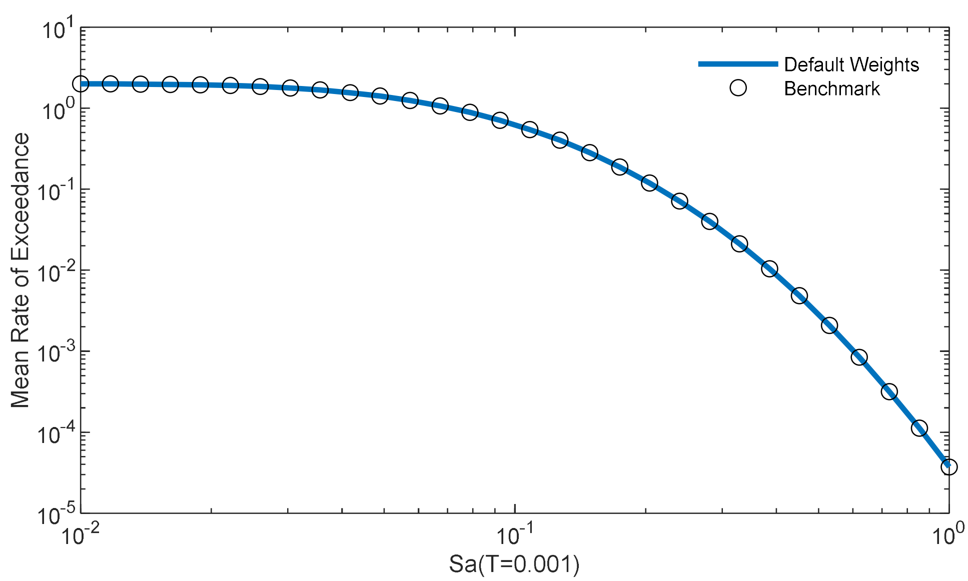
$\sigma_{logPGA} = 1.39 - 0.14M$

$P(Sa > y|m, r = 100) = 1 - \Phi\left(\frac{\log y - (-1.274 + 1.1m - 2.1\ln(20 + \exp(-0.485 + 0.5240m)))}{1.39 - 0.14}\right)$

With $f_M(m) = \frac{\beta\, exp\left(-\beta(M - M_{min})\right)}{1 - exp\left(-\beta(M_{max} - M_{min})\right)}$ and $f_R(r) = \delta(r - 100)$, the hazard integral is

$\lambda_y = NM_{min} \int P(Sa > y|m, R) f_M(m) f_R(r) dm dr$

$$\lambda_y = 2\int_5^{6.5} P(Sa > y|m, r = 100) \frac{\log(10)\ exp\left(-\log(10)\,(m - 5)\right)}{1 - exp\left(-\log(10)\,(6.5 - 5)\right)} dm$$



Independent MATLAB implementation

```
NMmin   = 2;
Mmin    = 5;
Mmax    = 6.5;
b       = 1;
beta    = b*log(10);
rrup    = 20;
M       = linspace(Mmin,Mmax,100000);
C       = [-0.624 1.0 0.000 -2.100 1.29649 0.250 0.0];
lny     = C(1)+C(2)*M+C(4)*log(rrup+exp(C(5)+C(6)*M));

C       = [1.39 0.14 0.38 7.21];
sigma   = C(1)-C(2)*M;
y       = logsp(0.01,1,30);
lambda = zeros(size(y));
for i=1:length(y)
    xhat = (log(y(i))-lny)./sigma;
    P    = 1-normcdf(xhat);
    fm   = beta*exp(-beta*(M-Mmin))./(1-exp(-beta*(Mmax-Mmin)));
    lambda(i) = NMmin*trapz(M,P.*fm);
end
loglog(y,lambda,'.-')
```