Hantush well function

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Hantush' well function as a power series

See Bruggeman (1999, p877)

$$W\left(\tau,\rho\right)=\sum_{n=0}^{\infty}\frac{\left(-1\right)^{n}}{n!}\tau^{n}E_{n+1}\left(\frac{\rho^{2}}{4\tau}\right)$$

$$\tau=\frac{\rho^{2}}{4u}$$

$$u=\frac{\rho^{2}}{4\tau}$$

This gives the function in terms of u and ρ.

$$W\left(u,\rho\right)=\sum_{n=0}^{\infty}\frac{\left(-1\right)^{n}}{n!}\left(\frac{\rho^{2}}{4u}\right)E_{n+1}\left(u\right)$$

$$E_{n+1}\left(u\right)=\frac{1}{n}\left\{e^{-u}-uE_{n}\left(u\right)\right\},\ \ n=1,2,3...$$

$$E_{1}=expint=Theis$$

Het argument is

$$f=\frac{\left(-1\right)^{n}}{n!}\left(\frac{\rho^{2}}{4u}\right)^{n}$$

Dus

$$f_{n+1}/f_{n}=-\frac{1}{n}\frac{\rho^{2}}{4u}$$

$$f_{0}=1$$