Problems of building airtightness evaluation method

Since the exponent n in the gap power law equation (3) varies from 1 to 2, it is unreasonable to set the constant 2 to n and apply equation (4).

$$\Delta p = \frac{\rho}{2}\left(\frac{q}{s}\right)^{n} \quad (3) \qquad \Delta p = \frac{\rho}{2}\left(\frac{q}{\alpha A}\right)^{2} \quad (4)$$

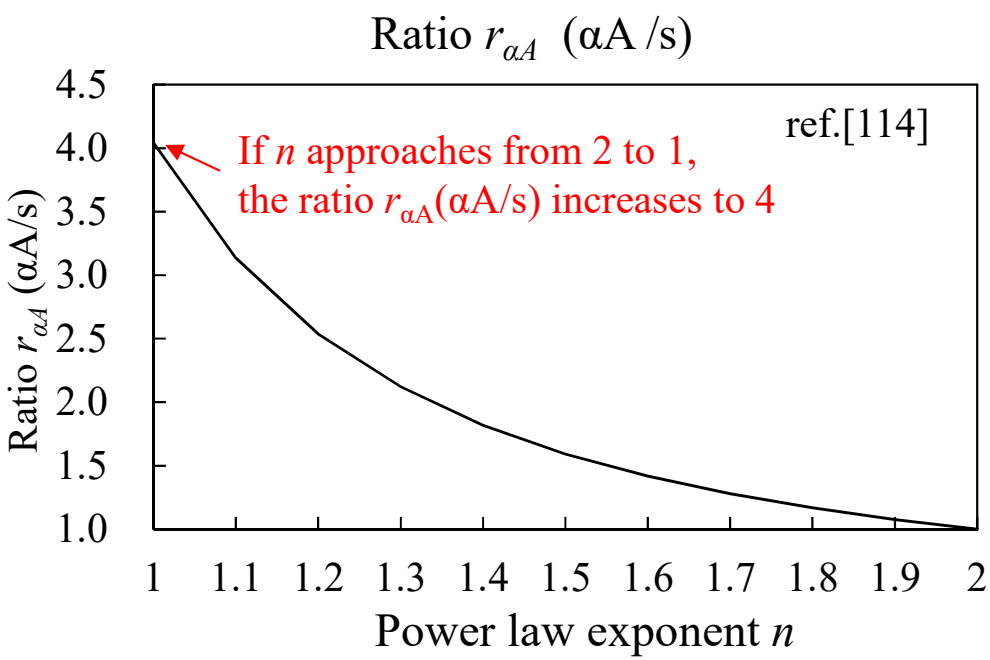
A ratio $r_{\alpha A}$ by two type gap opening areas is defined.

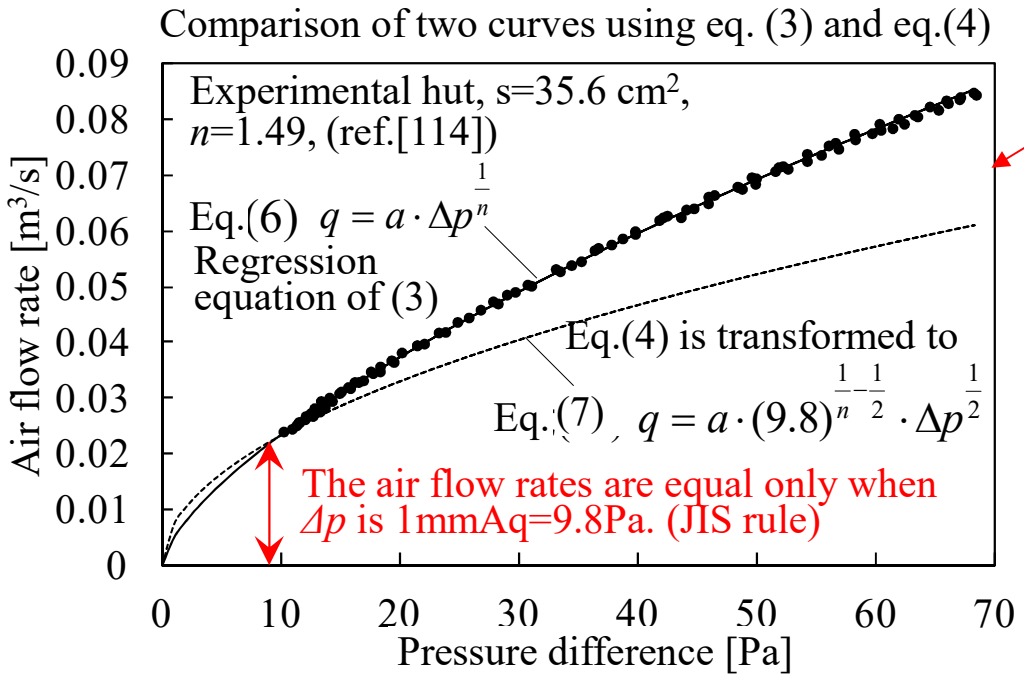
$$r_{\alpha A} = \frac{\alpha A}{s} = \left(\frac{\rho}{2 \cdot 9.8}\right)^{\frac{1}{2}-\frac{1}{n}} \quad (5)$$

ref.[114]

αA : Total equivalent gap opening area

s : Simple equivalent gap opening area





Even if the actual P-Q characteristic curve of the gap and the curve with the exponent set to 2 are matched only at Δp = 1 mmAq = 9.8Pa, the two are significantly different at other Δp.

Airtightness is evaluated only using the equivalent gap area αA, called the C-value, and the exponent n is often ignored. Is this because the exponent n has no physical meaning?

Therefore, wouldn't a quadratic model be better, since it can take into account not only the "gap area" but also the "gap depth"?