

① $v(r, \theta) = C(25 - r^2)$

② $v(5, \theta) = 0$

③ $v(0, \theta) = 25C$

④
$$\int_0^{2\pi} \int_0^5 C(25 - r^2) r dr d\theta = C \int_0^{2\pi} \int_0^5 (25r - r^3) dr d\theta$$

$$= C \int_0^{2\pi} \left[\frac{25}{2} r^2 - \frac{1}{4} r^4 \right]_0^5 d\theta$$

$$= C \int_0^{2\pi} \left(\frac{625}{2} - \frac{625}{4} \right) d\theta \quad \frac{1625}{36} \cdot 2\pi$$

$$= \frac{1625}{2} \pi C = 981.7 C \text{ in}^3/\text{sec}$$

⑤ $60(981.7C) = 58902 C \text{ in}^3$

⑥ $1 \text{ gal} = 231 \text{ in}^3 \quad 78.6(231) = 18156.6 \text{ in}^3$

⑦ $18156.6 = 58902C \implies C = 0.3083$

⑧ Average speed = $\frac{\frac{625}{2} \pi C}{25\pi} = \frac{25}{2} C \text{ in}/\text{sec}$

⑨ Max speed = $v(0, \theta) = 25C$, twice the average speed