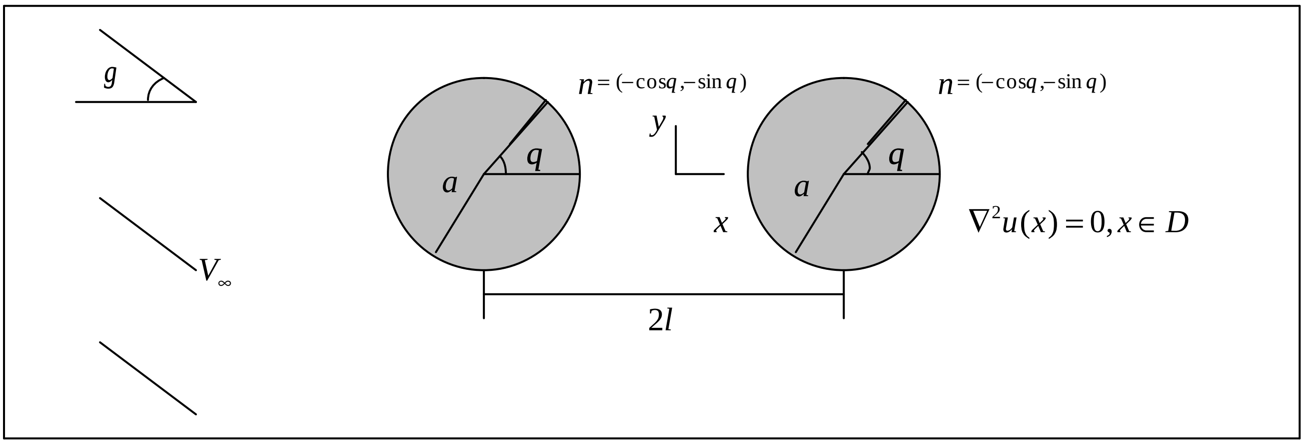
程式 96 雙圓柱流場問題

Two parallel cylinders of radius a with axes a distance $2l$ apart are placed in a plane-parallel flow of an ideal fluid, making angle g with the line joining the centers of the cylinders. Find the resulting velocity potential.

$$u(a,b) = V_\infty \sqrt{l^2 - a^2} \times \{\cos g [\frac{\sinh a}{\cosh a + \cos b} + 2\sum_{n=1}^{\infty}(-1)^n \frac{e^{-na_0}}{\cosh na_0}\sinh na \cos nb] + \sin g [\frac{\sin b}{\cosh a + \cos b} + 2\sum_{n=1}^{\infty}(-1)^n \frac{e^{-na_0}}{\sinh na_0}\cosh na \sin nb]\}$$

where $\cosh a_0 = l/a$ and V_∞ is the velocity of the flow far from the cylinders.



$u = V_\infty x \cos g - V_\infty y \sin g + u_h$, $x \in D$

$\frac{\partial u}{\partial n} = 0$, $x \in B$ ——— $\frac{\partial u_h}{\partial n_s} = V_\infty \cos q \cos g - V_\infty \sin q \sin g$, $x \in B$

References

1.N. N. Lebedev, I. P. Skalskaya, Y. S. Uflyand, Worked Problems in Appled Mathematics, Dover, 1979. Page 214