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### Example

A semi-infinite aluminum cylinder ( $k = 237 \text{ W/m}\cdot\text{°C}$ ,  $\alpha = 9.71 \times 10^{-5} \text{ m}^2/\text{s}$ ) of diameter  $D = 15 \text{ cm}$  is initially at a uniform temperature of  $T_i = 150\text{°C}$ . The cylinder is now placed in water at  $10\text{°C}$ , where the convection heat transfer coefficient is  $h = 140 \text{ W/m}^2\cdot\text{°C}$ . Determine the temperature at the center of the cylinder  $10 \text{ cm}$  from the end surface  $8 \text{ min}$  after the start of the cooling.

