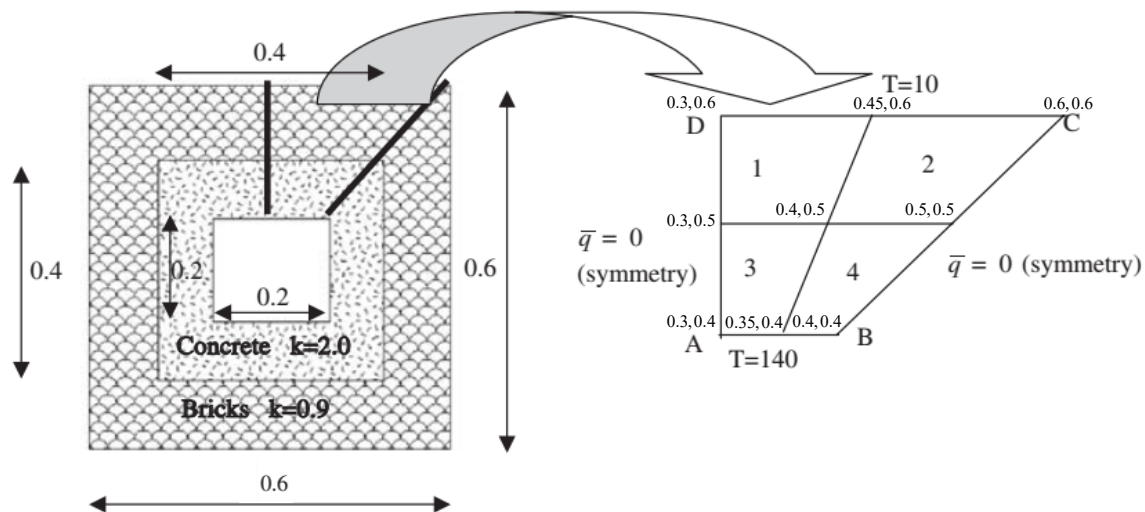


**HOMEWORK 6****ASSIGNED: 10/16/25****DUE: 10/23/25 on ELC (MATLAB script and PDF with results, sketch of selected nodal/element numbering and work done by hand), before class**

This is problem 8.6 from your textbook with minor modifications. Consider a chimney constructed of two isotropic materials: dense concrete ( $k = 2.0 \text{ W/}^\circ\text{C}$ ) and bricks ( $k = 0.9 \text{ W/}^\circ\text{C}$ ). The temperature of the hot gases on the inside surface of the chimney is  $140^\circ\text{C}$ , whereas the outside is exposed to the air and fixed at  $T = 10^\circ\text{C}$ . The dimensions in meters are shown below.

Here we exploit symmetry, only considering  $1/8^{\text{th}}$  of the chimney cross-sectional area. Mesh the problem with **4 quadrilateral elements, four nodes each for a total of 9 nodes**. Note that the element boundaries have to coincide with the interface between the concrete and the bricks. **Solve for the temperature at the remaining nodes**. Assume no heat flux across the boundaries and no heat generation within the chimney.



**Figure 8.23** Chimney cross section and a four-element finite element mesh for  $1/8$  of the problem domain.