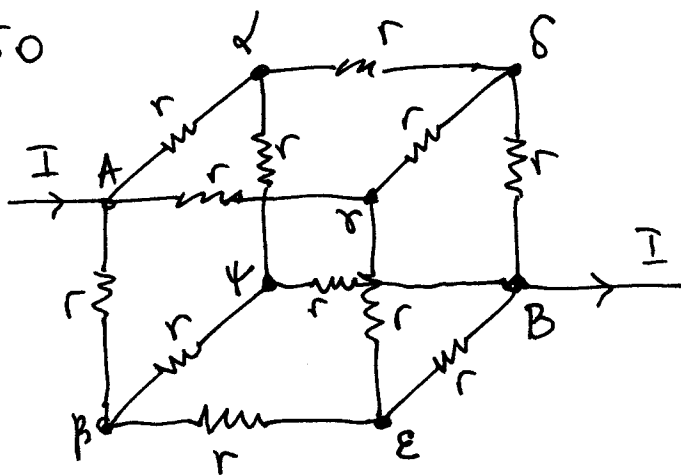


21.50



(a) "Symmetry arguments"

It's obvious that the "line" AB is the axis of symmetry for the cube (the diagonal)

With respect to A the nodes C, E, G should have the same potential V_A (the same apply to B and D, F, H)

From symmetry we also see that, for example, the difference of potential b/w E and G, and b/w E and C should be the same ($V_{EG} = V_{EC}$)

So, on symmetry grounds the current through branches AC, CE, CG, BD, DE, DF should be $\frac{I}{3}$

Through $\{EG, EF\}$, $\{CD, CF\}$, $\{AD, AG\}$, $\{BC, BF\}$ we expect $I/6$.

(b) Let us calculate U_{AB} . According to the values of currents "guessed" above we can say that

$$U_{AB} = U_{AC} + U_{CD} + U_{DB} = r \cdot \frac{I}{3} + r \cdot \frac{I}{6} + r \cdot \frac{I}{3}$$

hence $U_{AB} = \frac{5}{6} I r$ unsure about the sign; doesn't matter definition

but equivalent resistance is $R_e \stackrel{\text{definition}}{=} \frac{U_{AB}}{I} = \frac{5}{6} r$
total current $\rightarrow I$