8.5

A thick wood slab spread a flame downward at 0.1 mm/s; the slab was initially at 20 C. If the slab were preheated to 100 C, what is the spread rate? Assume Tig=450C.

$Vp := 0.1 \cdot 10^{-3}$ $Ts := 20$ $Tig := 450$

$phibykrhoc := Vp \cdot (Tig - Ts)^2$ $phibykrhoc = 18.49$

$Ts1 := 100$ $Vp := \frac{phibykrhoc}{(Tig - Ts1)^2}$ $Vp = 1.509 \times 10^{-4}$

There is a 50% increase in the flame spread rate associated with preheating the wood sample. Note that we have assumed that there is no change in the kinetics which may not be accurate.