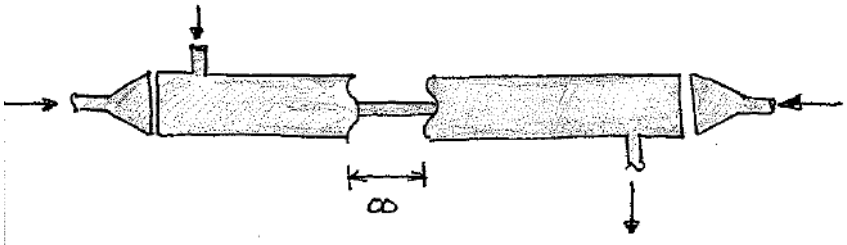
NOTES: **Effectiveness-NTU method**

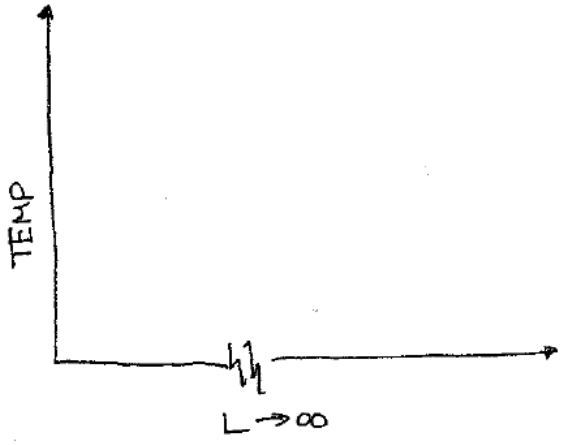
CONSIDER A *Counterflow* double-pipe HXR of ∞ LENGTH:



TWO THINGS CAN HAPPEN.

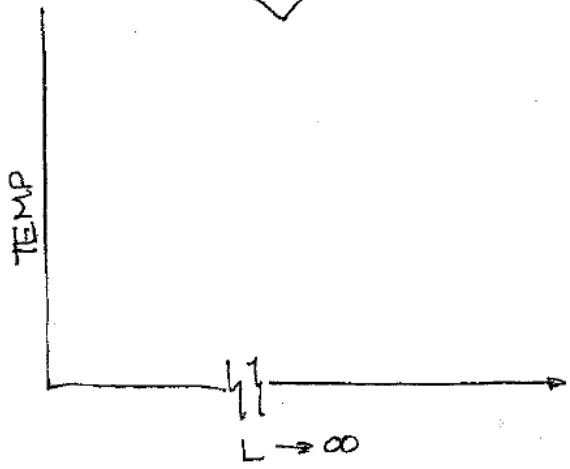
EITHER

The warmer fluid cools all the way down to the cooler fluid inlet temperature



OR

The cooler fluid warms all the way up to the warmer fluid inlet temperature



(HINT: WRITE ENERGY BALANCES FOR BOTH FLUIDS IN TERMS of TEMPERATURE RISE/DROP.)

EITHER WAY $\Delta TEMP_{MAX} =$

THIS LEADS TO A *Maximum heat transfer rate*
(WHEN $L \to \infty$)

$$\dot{Q}_{MAX} =$$

AND AN EFFECTIVENESS

$$\varepsilon \equiv \frac{\quad}{\quad} = \frac{\quad}{\quad} \quad *$$

OR

$$= \frac{\quad}{\quad} \quad *$$

* WHICH DO YOU USE?

IT CAN BE SHOWN

$$\varepsilon = f(\text{HXR TYPE}, \square, \square)$$

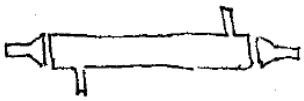
WHERE

$$= \frac{\quad}{\quad} (\quad)$$

$$= \frac{\quad}{\quad}$$

NOTES: Effectiveness-NTU method

HERE'S WHAT: Say you already have a HXR. You know these things:



- $T_{h,in}$
- $T_{c,in}$
- MASS FLOW RATES
- HXR UA, DIMENSIONS, ETC.

DESCRIBE HOW YOU WOULD USE THE LMTD METHOD TO FIND

- $\dot{Q}$
- $T_{h,out}$
- $T_{c,out}$

NOW USING THE ε-NTU METHOD:

1.)

2.)

3.)

4.)