PROBLEM 6-12N QUESTION

Complex Brayton Cycle With Regeneration, Pressure Loss, And Real Machines

Consider a helium Brayton Cycle with regeneration, pressure losses, and real machines. These are characterized by the following parameters:

$\zeta = 0.92$

$\beta = 1.025$

$\eta_t = \eta_c = 0.92$

The cycle operates at a pressure ratio of $r_p = 2.2$ between limiting temperatures of 303 K and 1083 K. For helium:

$\gamma = 1.66$

$c_p = 5.230$ kJ/kg K

For this cycle, find the thermal efficiency, η_{th}.

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