Problem 324A

A rocket engine consists of a reservoir containing gas at a high temperature and pressure (p_0) and a convergent-divergent nozzle with a throat area, A^*, and a diffuser exit area, A_E. If the flow is isentropic throughout (no shocks), the pressure in the flow exiting the diffuser is p_E and the surrounding atmospheric pressure is p_A find an expression for the thrust produced by the engine in terms of p_0, p_E, p_A, A^*, A_E and γ (the ratio of specific heats). Assume the flow in the throat is choked.