Week 9: Lecture 3

Other Types of Engines

1. Turbo-prop Engine
   - gas turbine drives the compressor and the propeller
   - propellers are best suited for low speed ($<$ 300 mph) flight
   - by-pass ratio defined as

$$by-pass\ ratio = \frac{mass\ flow\ by-passing\ the\ combustion\ chamber}{mass\ flow\ through\ the\ combustion\ chamber}$$

   - by-pass ratio of 100:1 or more
2. Turbo-fan Engine (Ducted Turbo-prop Engine)
   - best choice for fuel economy and speed
   - high speed exhaust gases are mixed with the lower speed air in the by-pass resulting in a considerable noise reduction
   - by-pass ratio can be adjusted
   - by-pass provides thrust for takeoff
   - the core provides thrust for cruising
   - used for speeds up to 600 mph
   - increasing the by-pass ration results in increased thrust
   - typical by-pass ratios are 5-6
3. Ramjet
   - no moving parts
   - compression is achieved by decelerating the high-speed incoming air in the diffuser
   - aircraft must already be in flight at a high speed