



# Fowler Flap Angle Study and Animation



By Cameron Parvini

# Fowler Flap History

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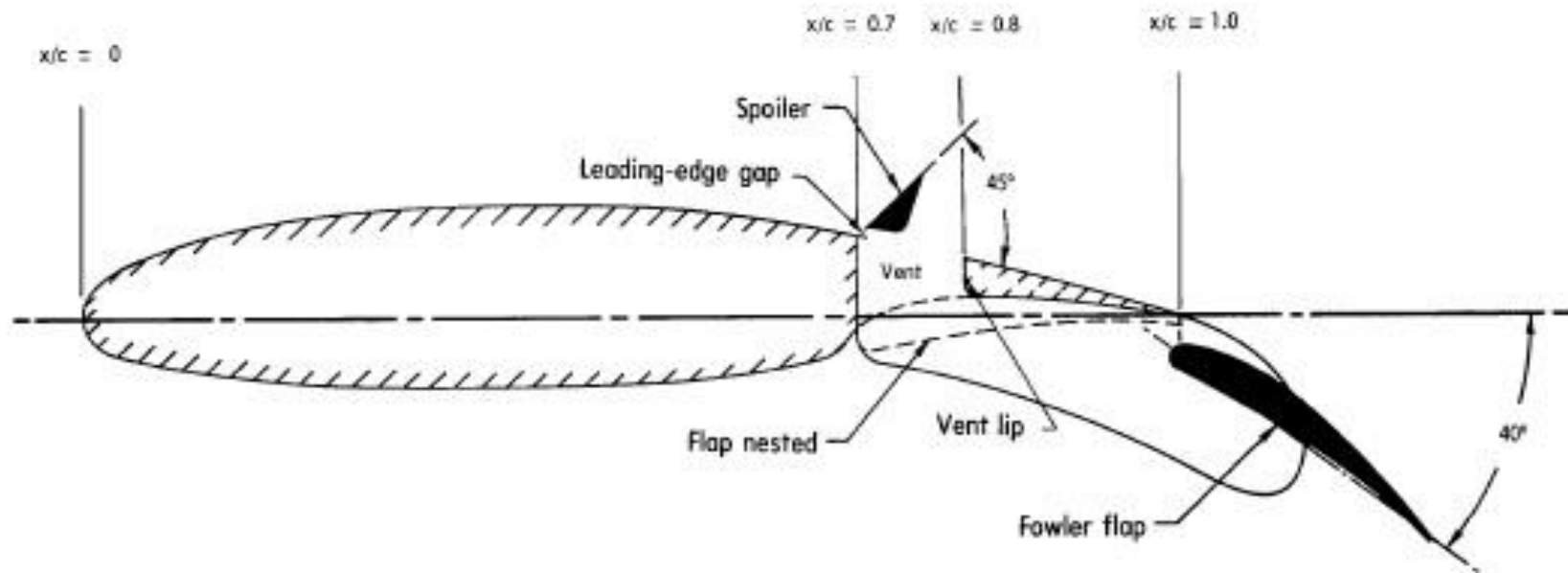
- ▶ Theorized in 1924 by Harlan D. Fowler
- ▶ Tested in 1927 by Fowler & Crewfoot
- ▶ Approved by NACA several years later

Figure 1: Extended Fowler Flap

<http://www.decodedscience.com/wing-flaps-for-lift-augmentation-in-aircraft/11831/2>



# Geometry



(a) GA(W)-1 airfoil with Fowler flap and spoiler.

Figure 3.- Flap deflections and positions.

## Figure 2: Fowler Flap Geometry

- ▶ Paulson, John W. Jr., \*Wind-Tunnel Investigation of a Fowler Flap and Spoiler for an Advanced General Aviation Wing,\* Langley Research Center, Hampton, VA 23665. June 1976. NASA TN D-8236.

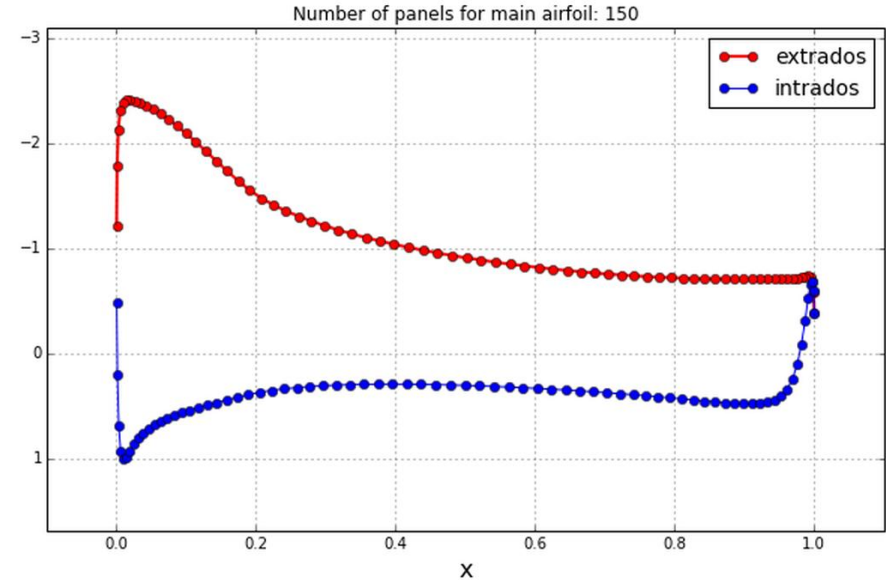
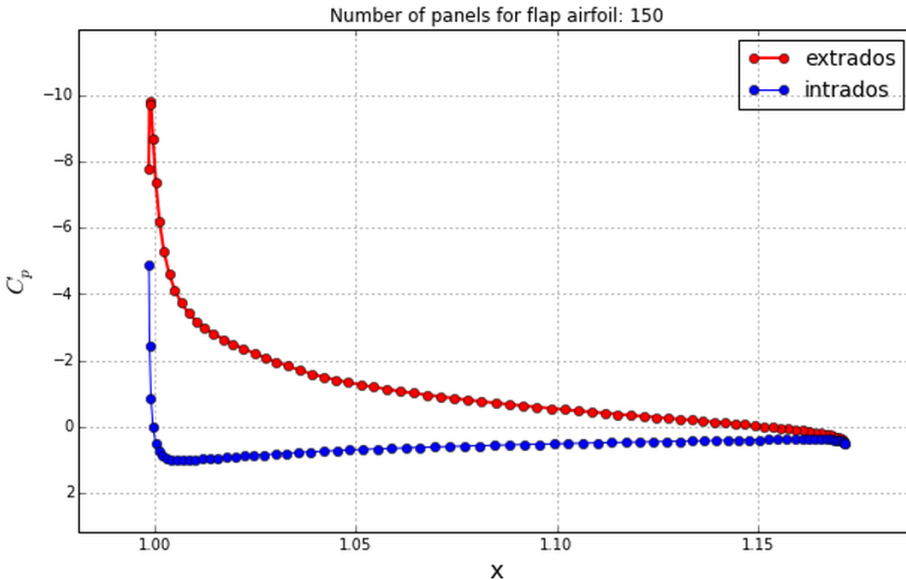
# Changes to Legacy Code

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- ▶ Several functions were altered to accept two foils
- ▶ Two new functions added:
  - ▶ `init( )`; Initialization function for the animation
  - ▶ `animate( )`; Script for plotting each frame of the animation



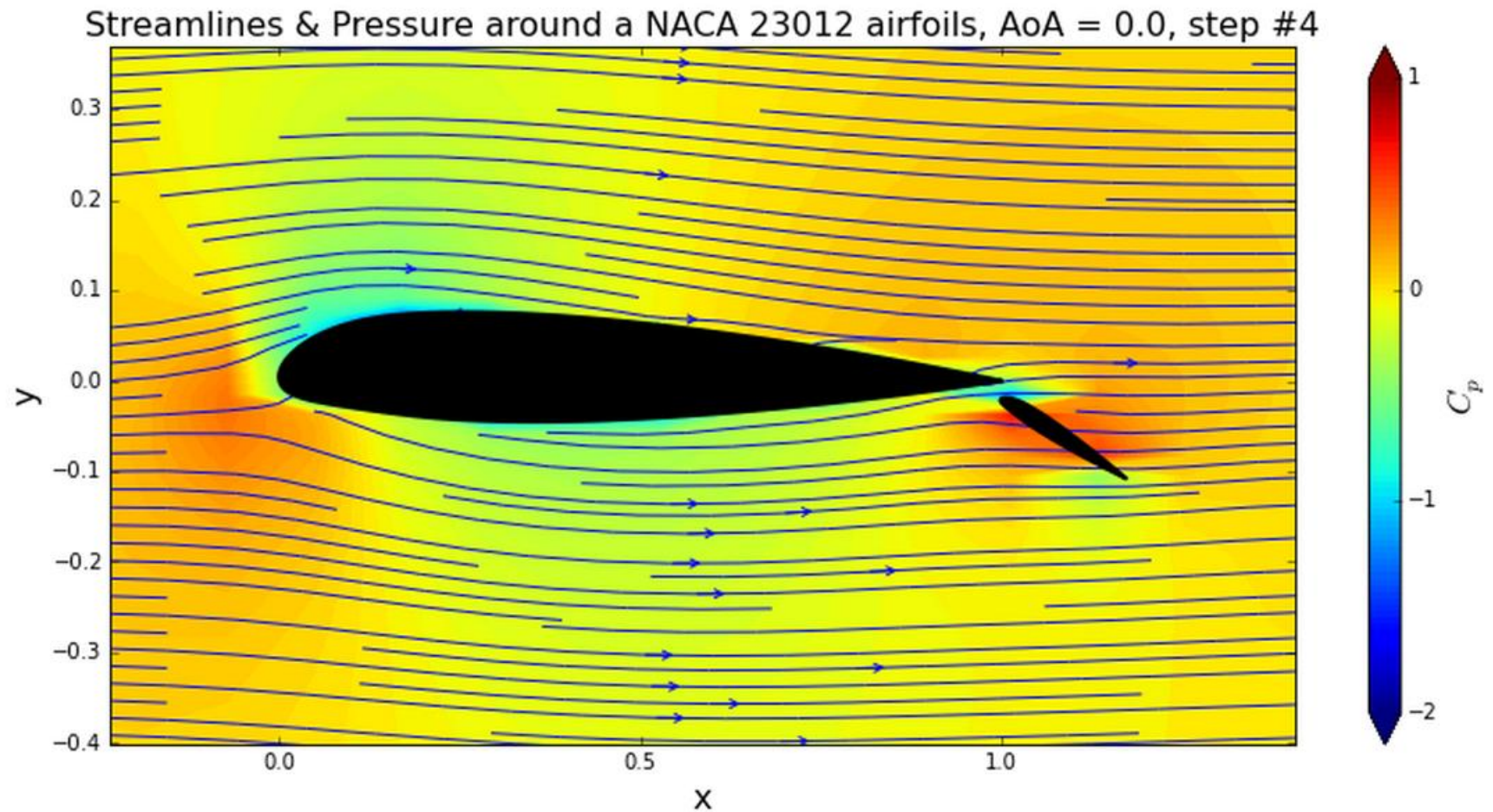
# Results



- ▶  $C_p$  appears within reason for the first several steps
- ▶ Lift and Accuracy calculations are reasonable
- ▶ Animation functions were slow, but the video is clean

# Results

## ► Streamlines and $C_p$ :



# Moving Forward

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- ▶ Could add functionality to slide flap out into position
- ▶ Time required to render all the steps is **terrible**, and should be improved
- ▶ Animating the intrados/extrados plots based on step
- ▶ Extension could be made to 3-body flow

