

# Fluid dynamics of car mirrors

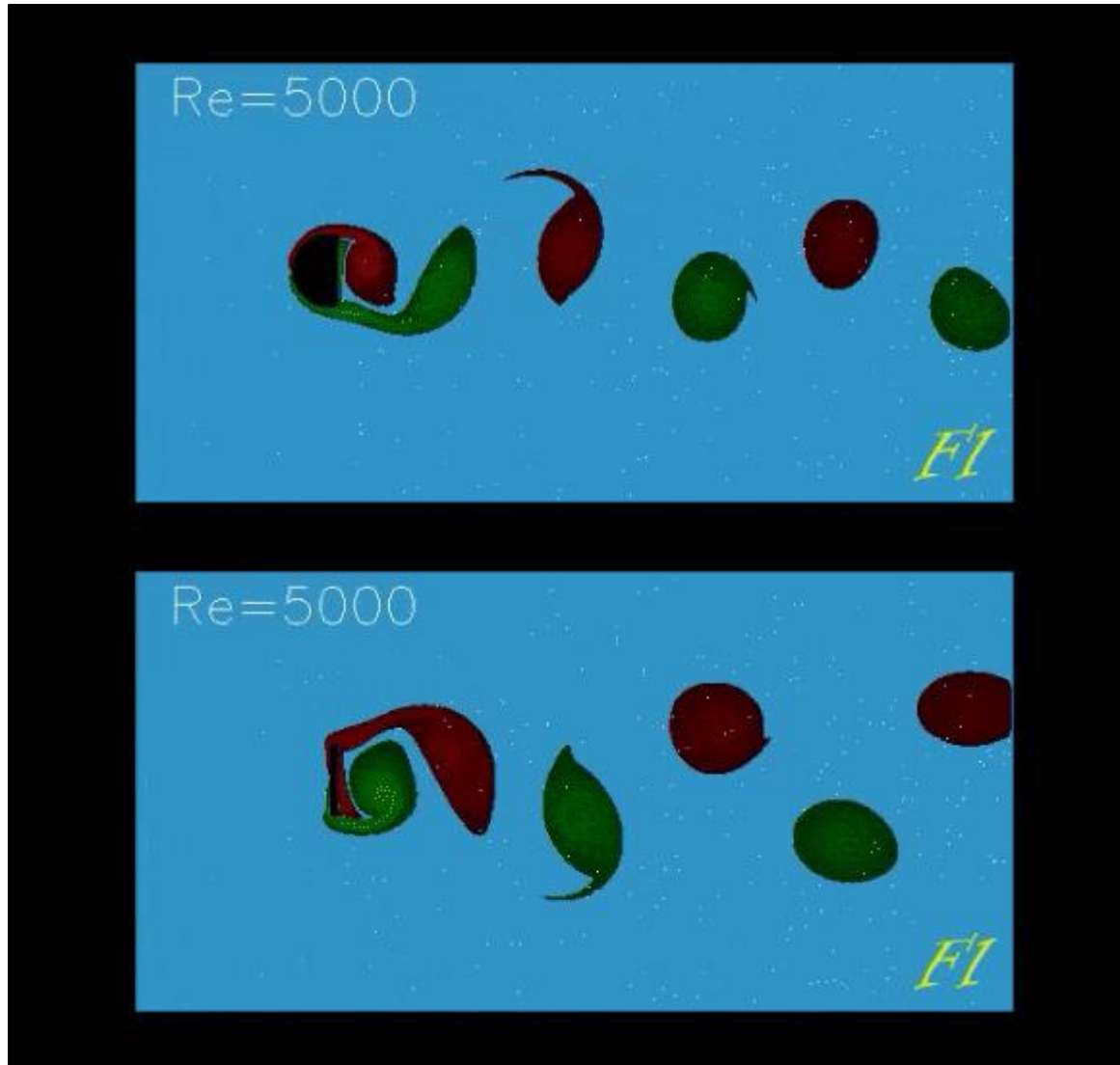
**Slides for the lesson**

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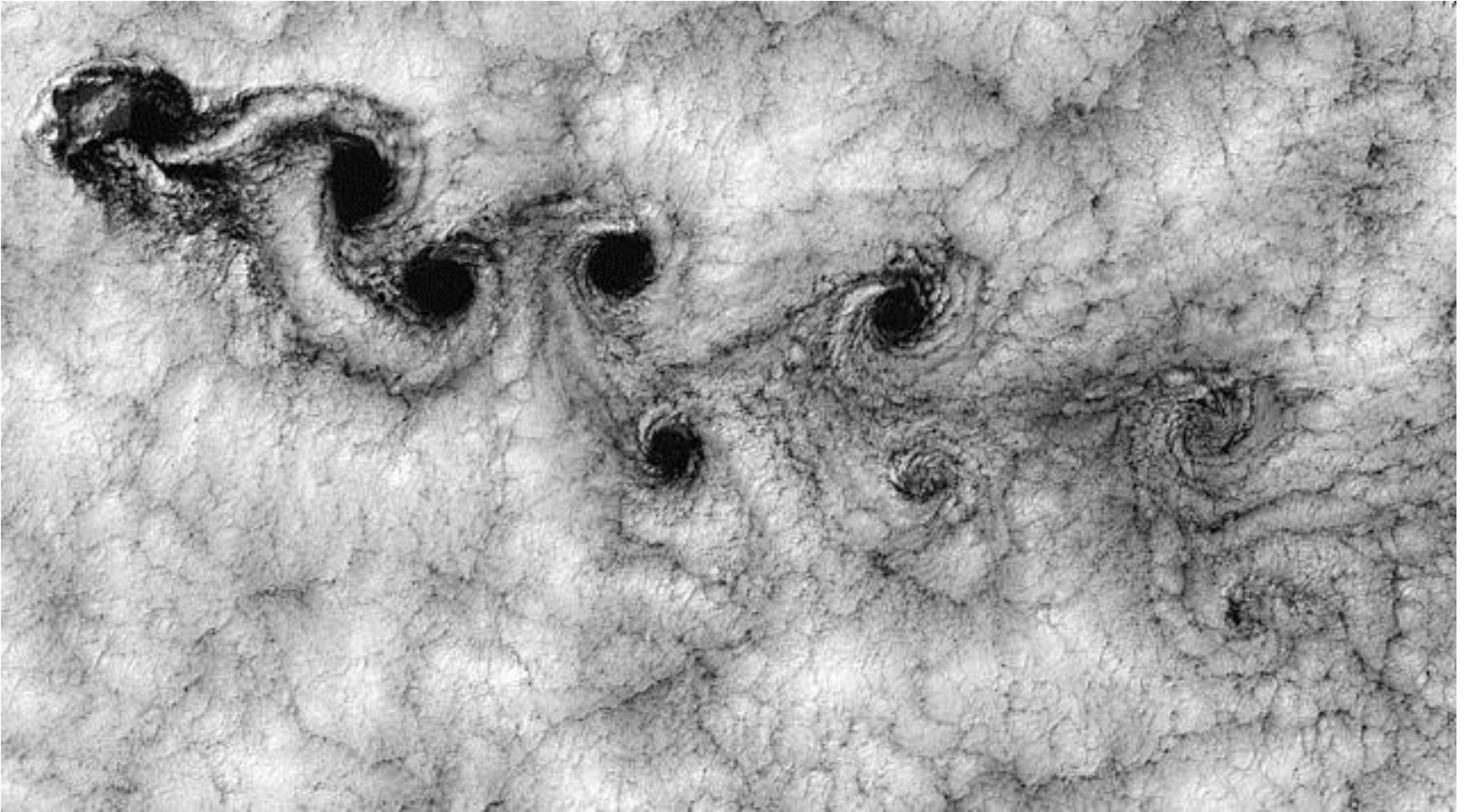
# Compare the side mirrors of the modern car and the old car



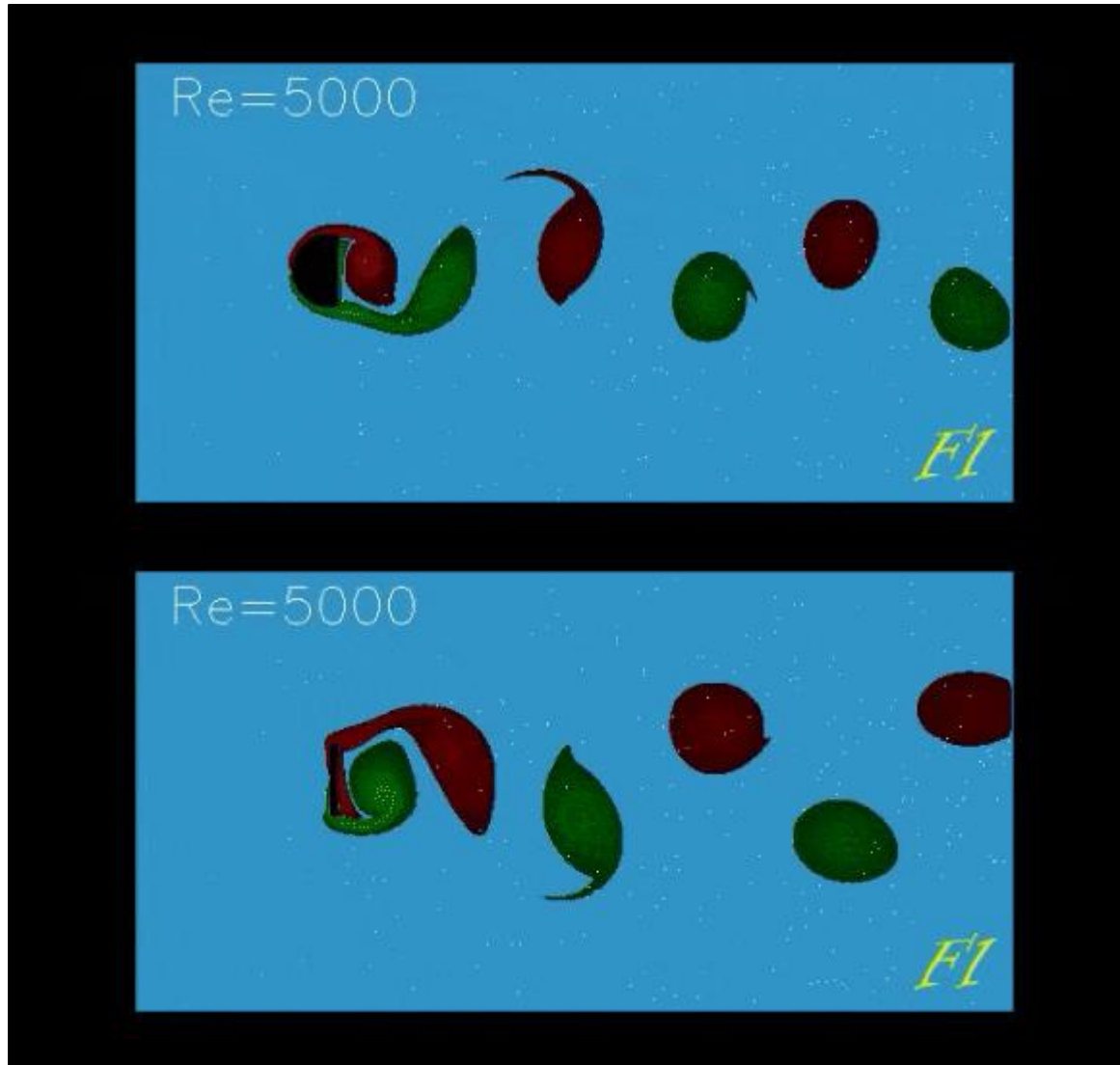
Snowflakes and vorticity are a convenient way to observe the pattern of fluid motion



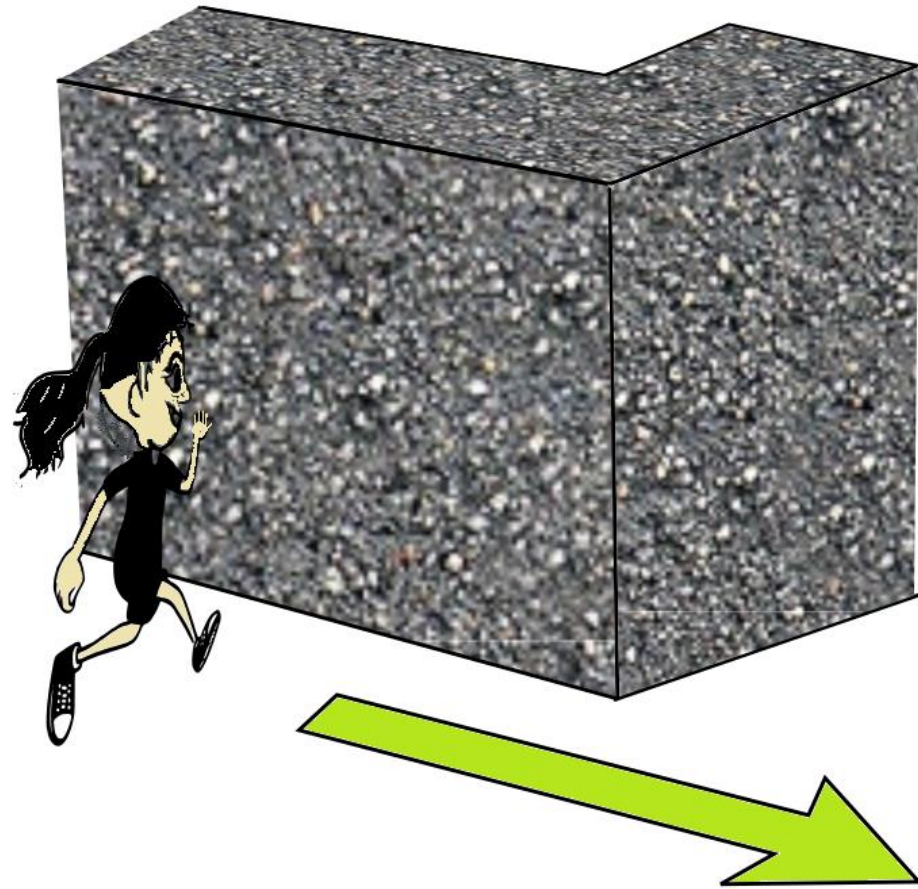
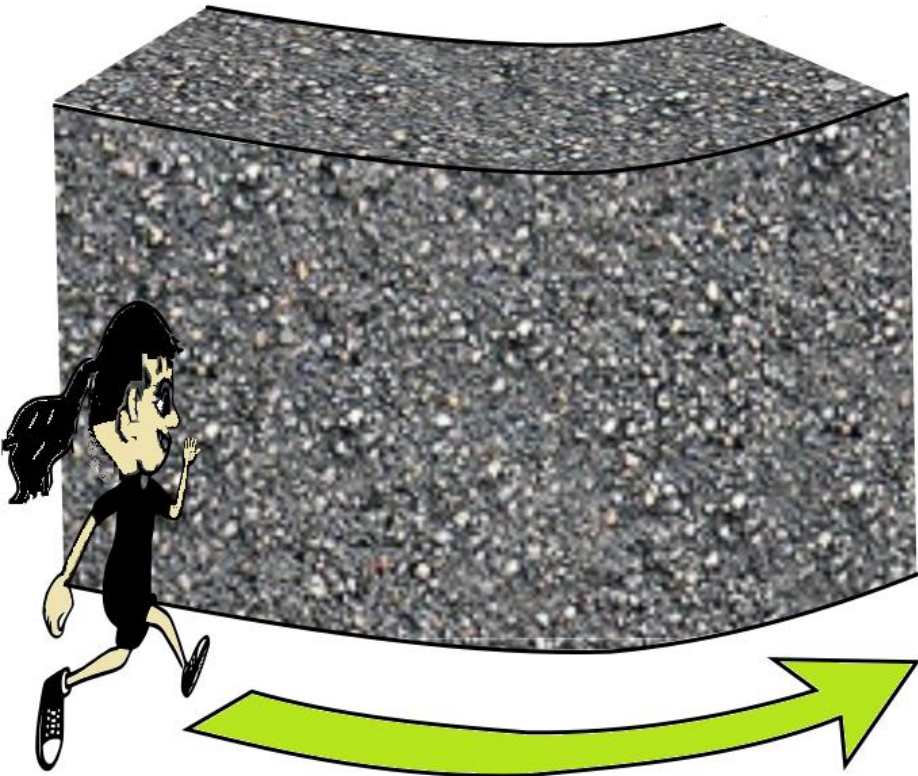
# Von Kármán vortex street visualized by clouds near the Robinson Crusoe Islands



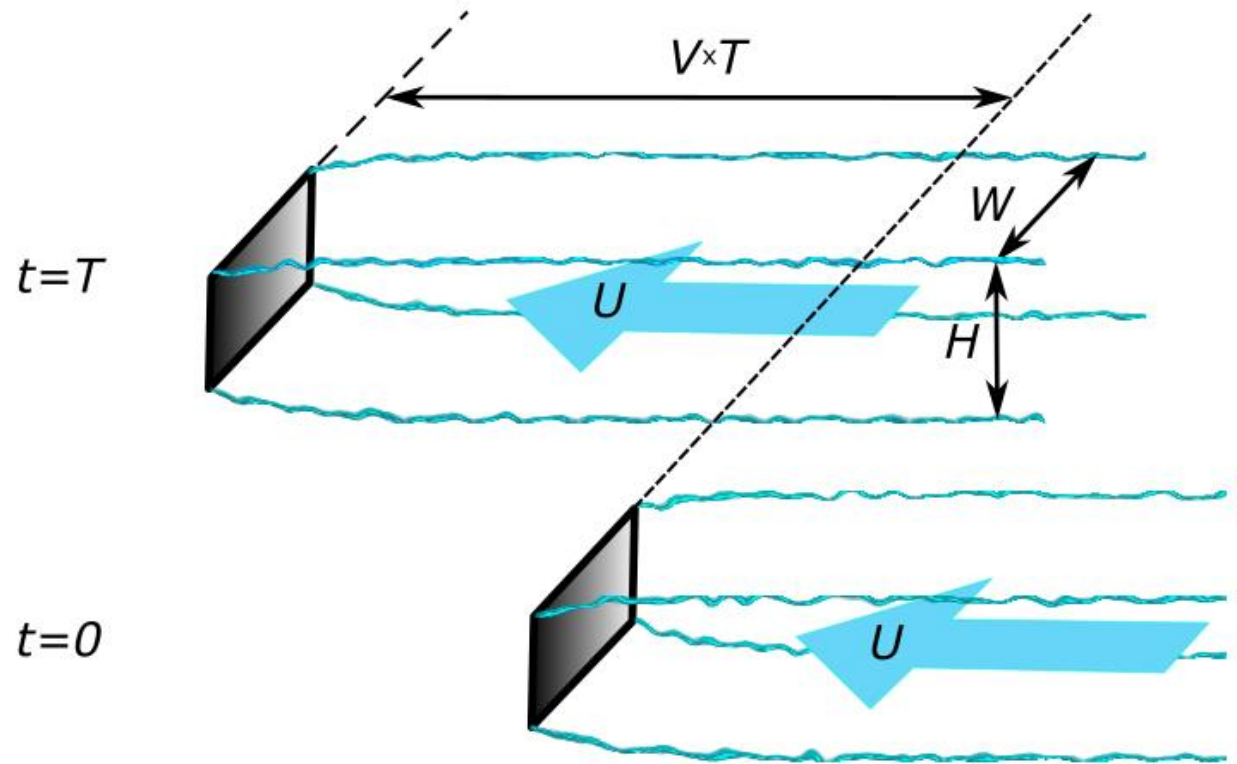
# Features of the flow past the mirrors: separation and wake



# Separation mechanism



# Drag force



Over a time  $T$ :

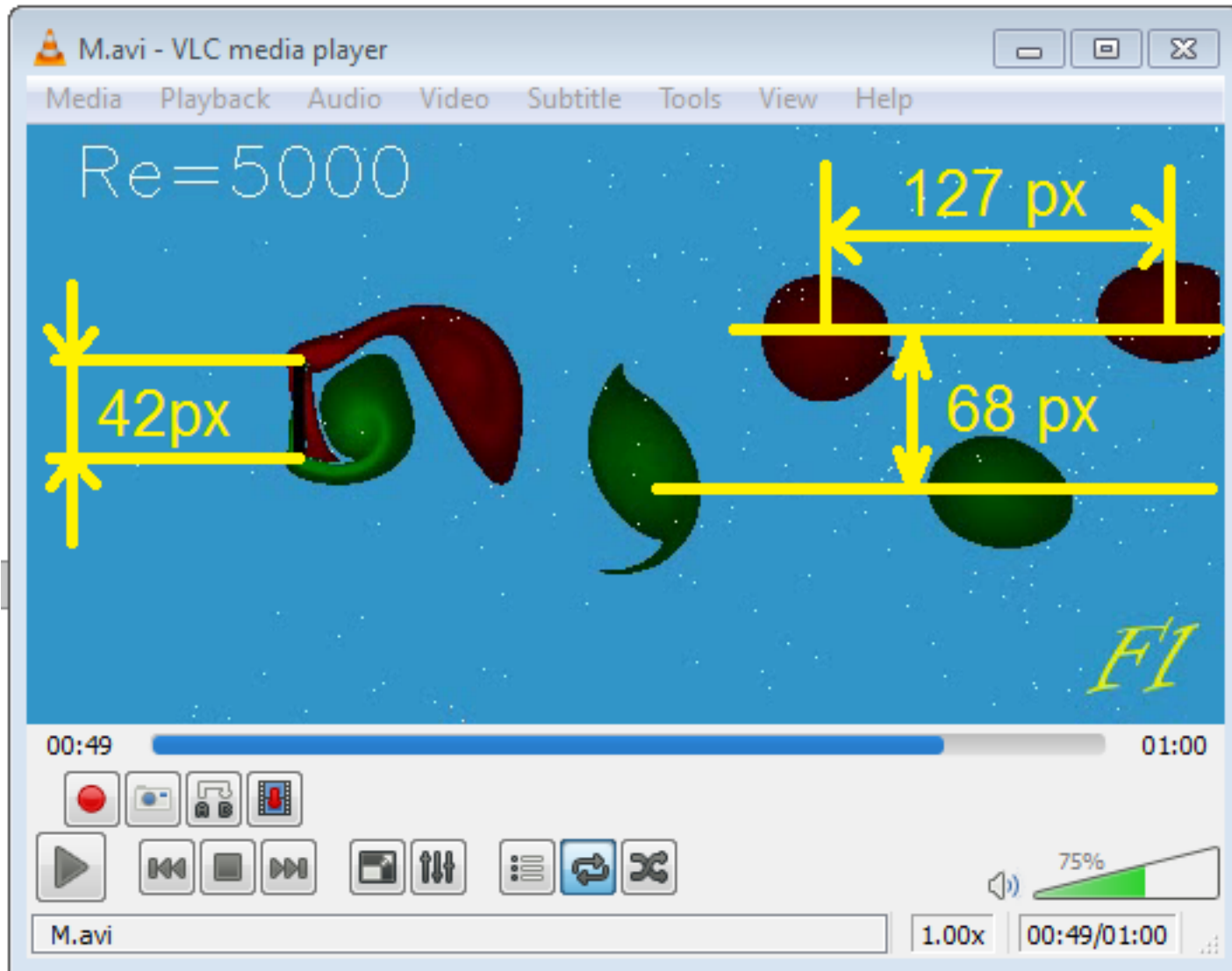
the mass of the wake has increased by  $\rho V T W H$

The kinetic energy of the wake has increased by  $\rho V T W H U^2 / 2$ .

The work of the drag force  $D$  was  $- D V T$

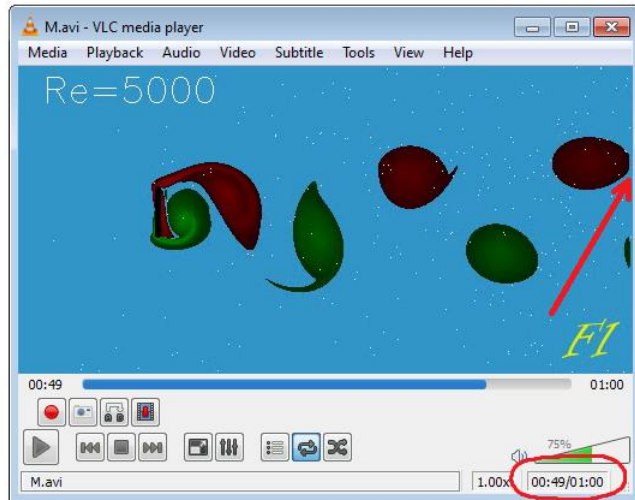
Hence  $D = \rho V W H U^2 / 2$ .

# Measuring the wake

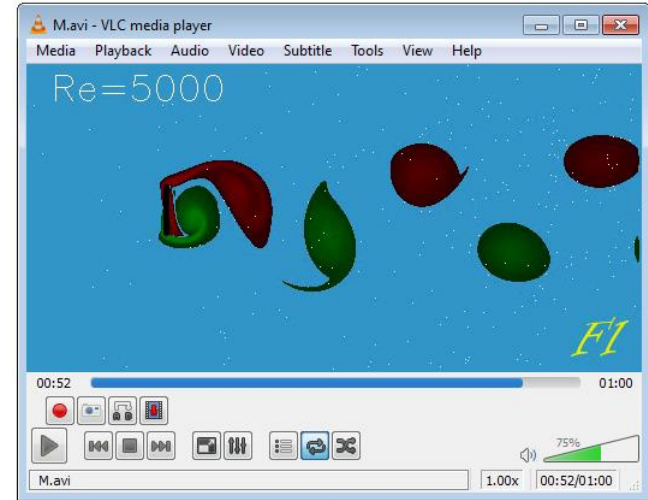




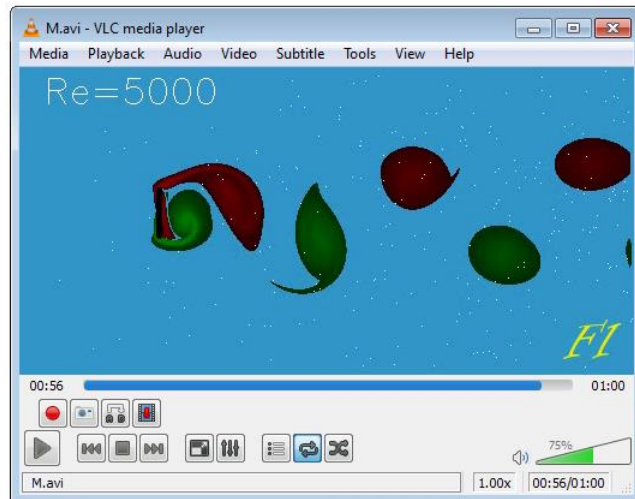
# Estimating the velocity in the wake



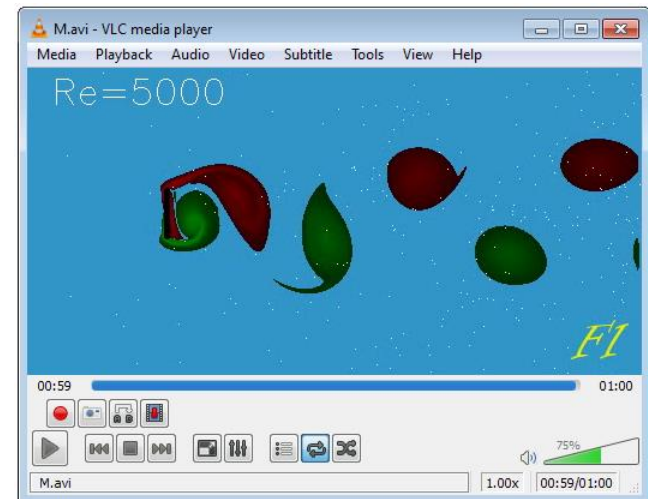
*Fig.L10 The wake at the 49th second.*



*Fig.L11 The wake at the 52nd second.*



*Fig.L12 The wake at the 56th second.*



*Fig.L13 The wake at the 59th second.*

End