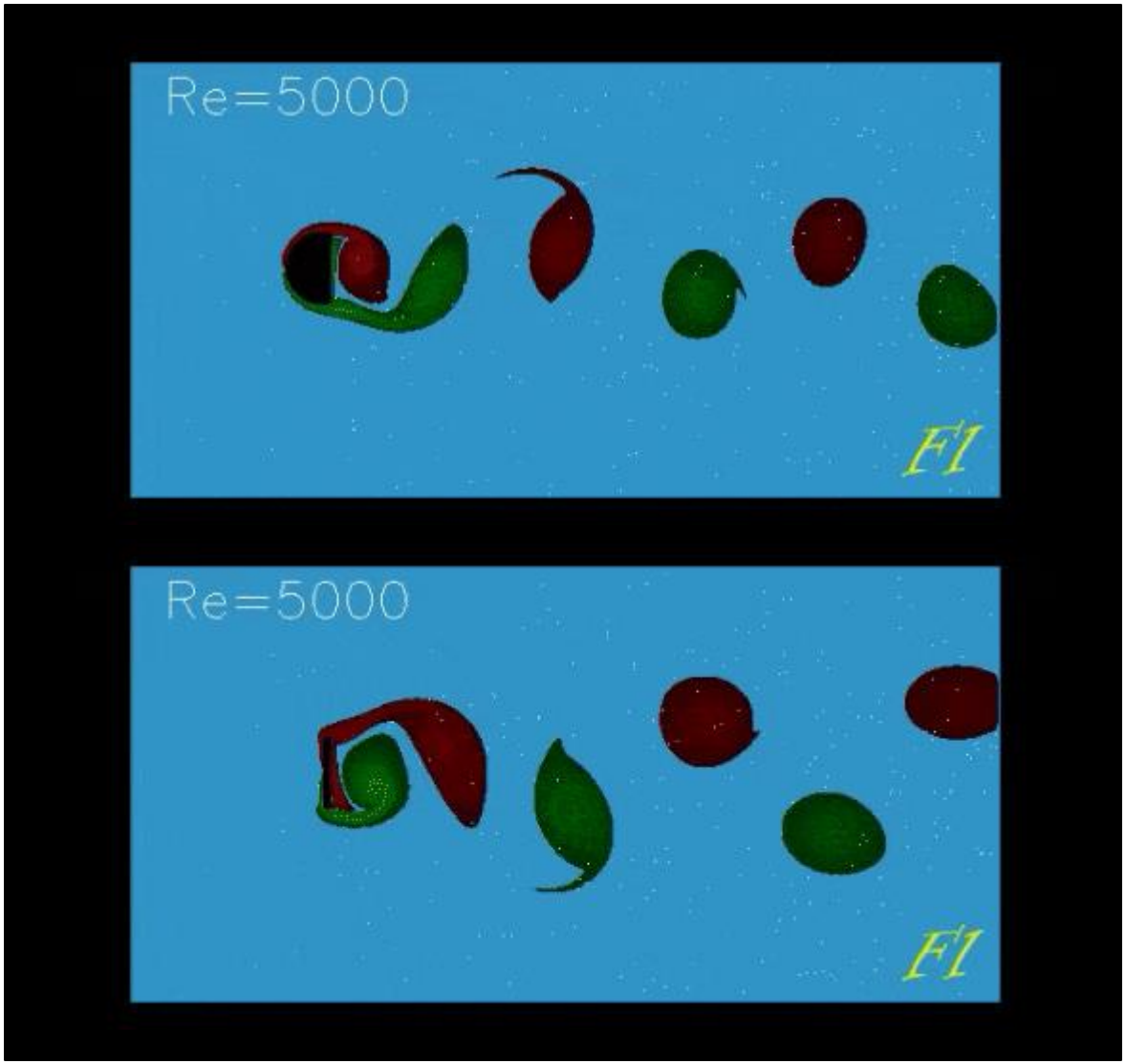
Fluid dynamics of car mirrors

Slides for the lesson

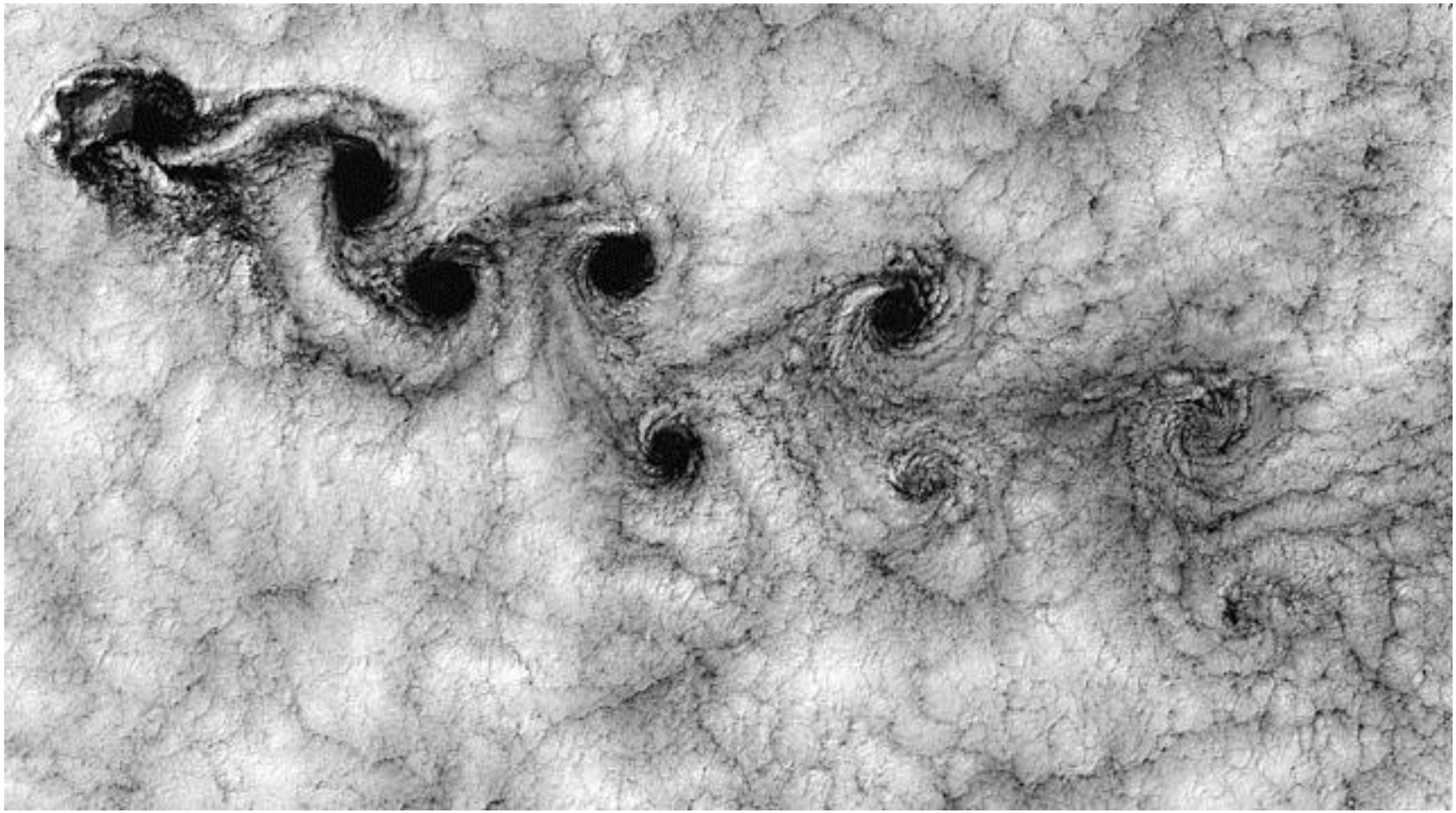
Compare the side mirrors of the modern car and the old car

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



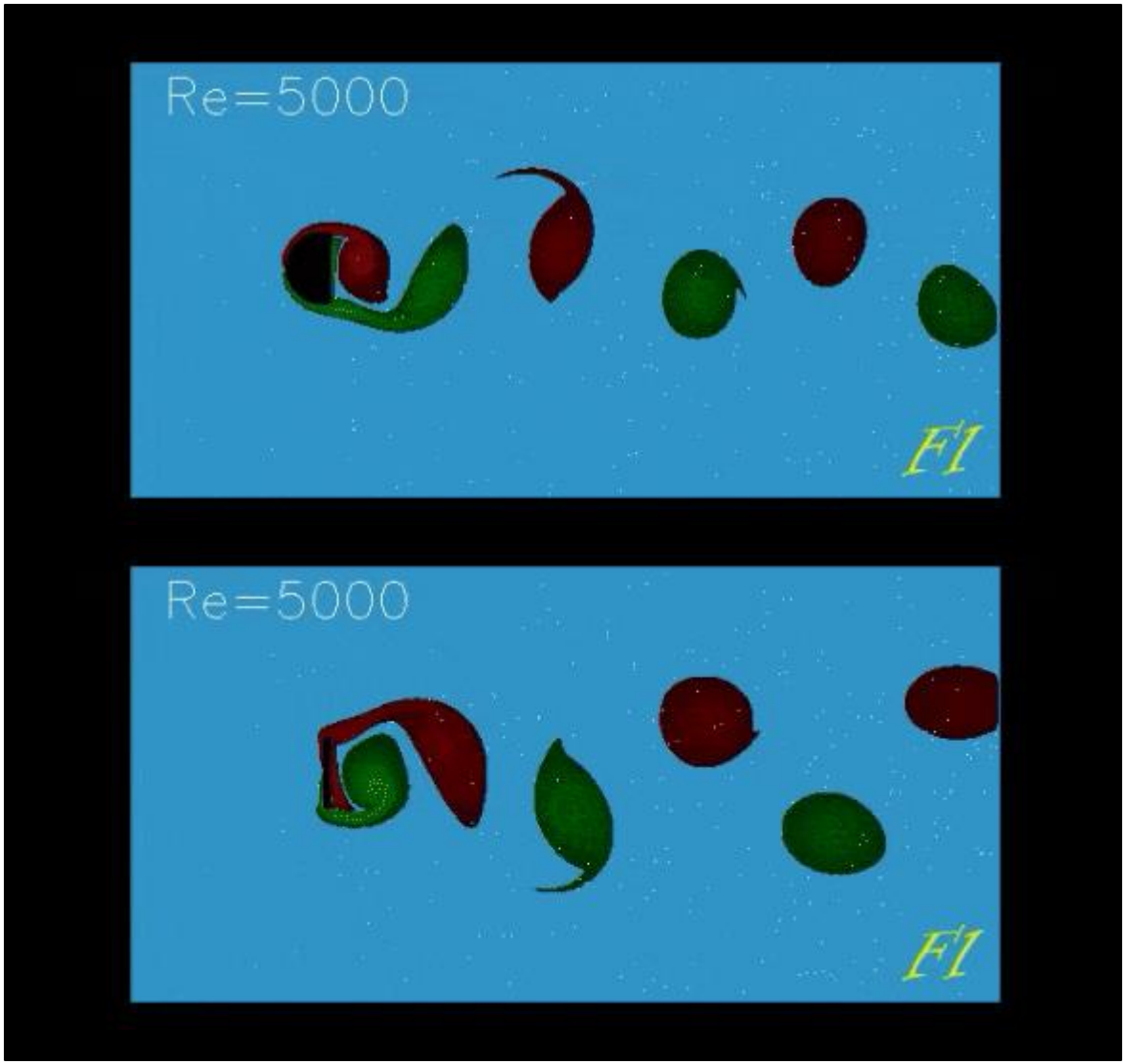
www.flowillustrator.com

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

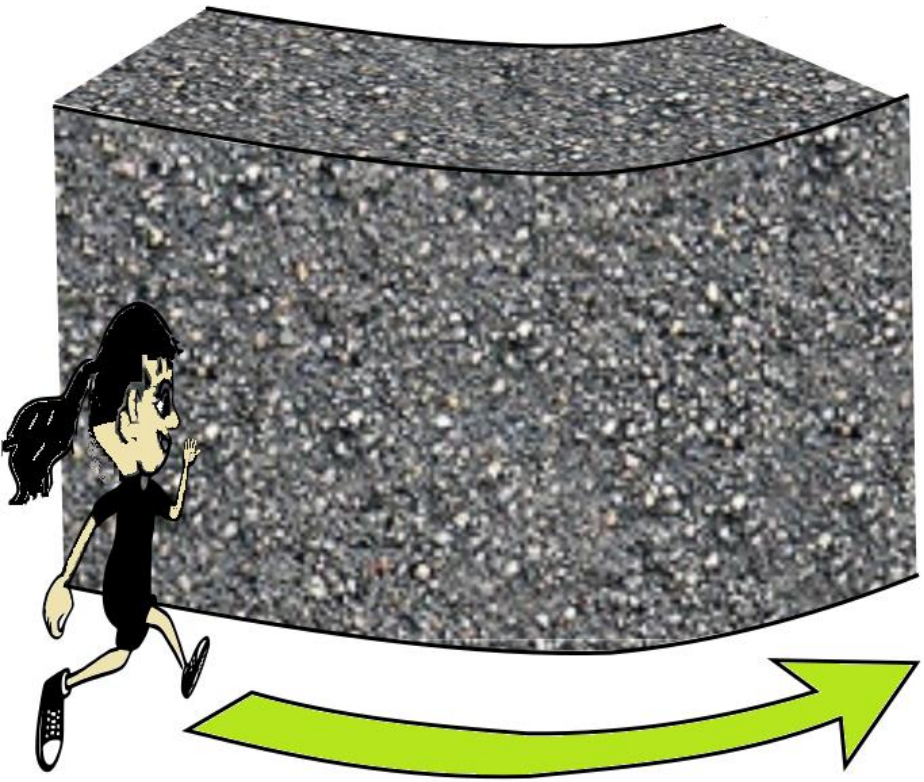


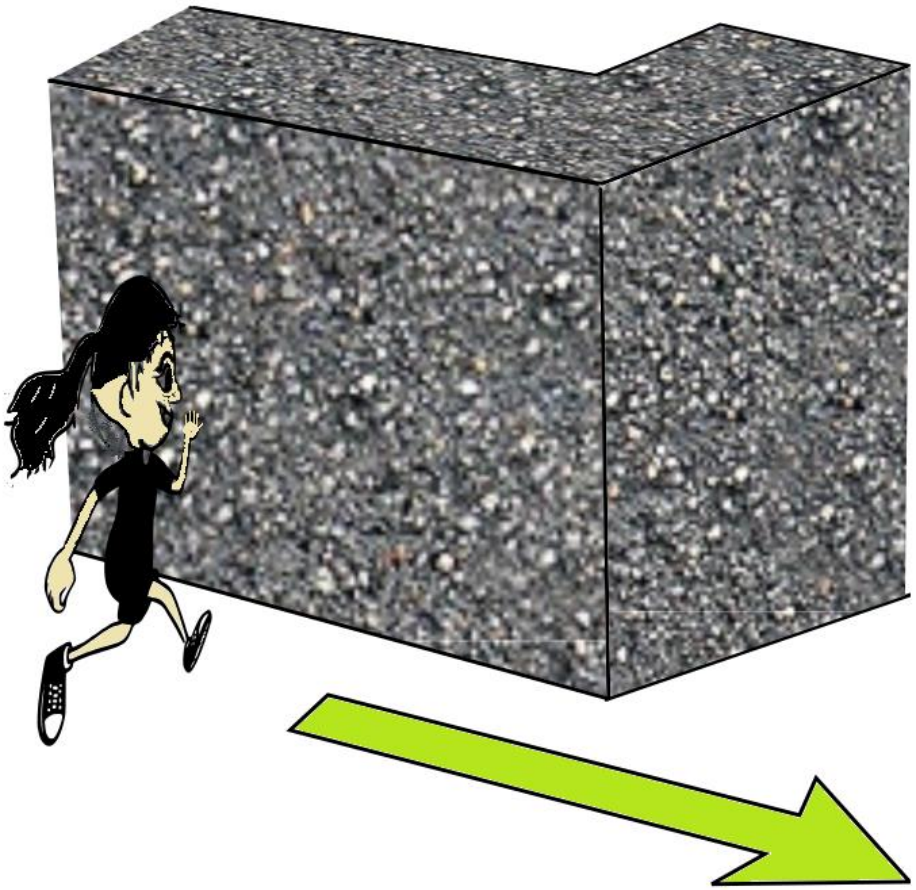
(*Image by Landsat [Public domain], from Wikimedia Commons*)

Features of the flow past the mirrors: separation and wake

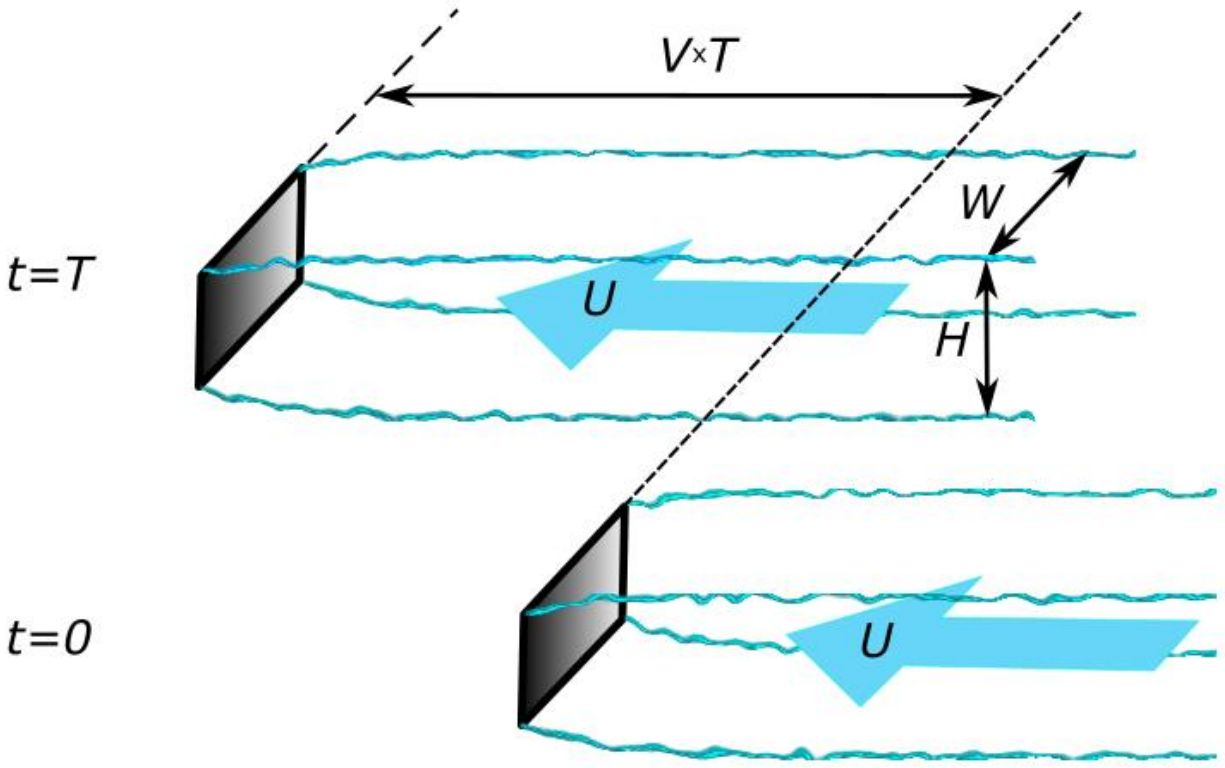


Separation mechanism





Drag force



Over a time *T:*

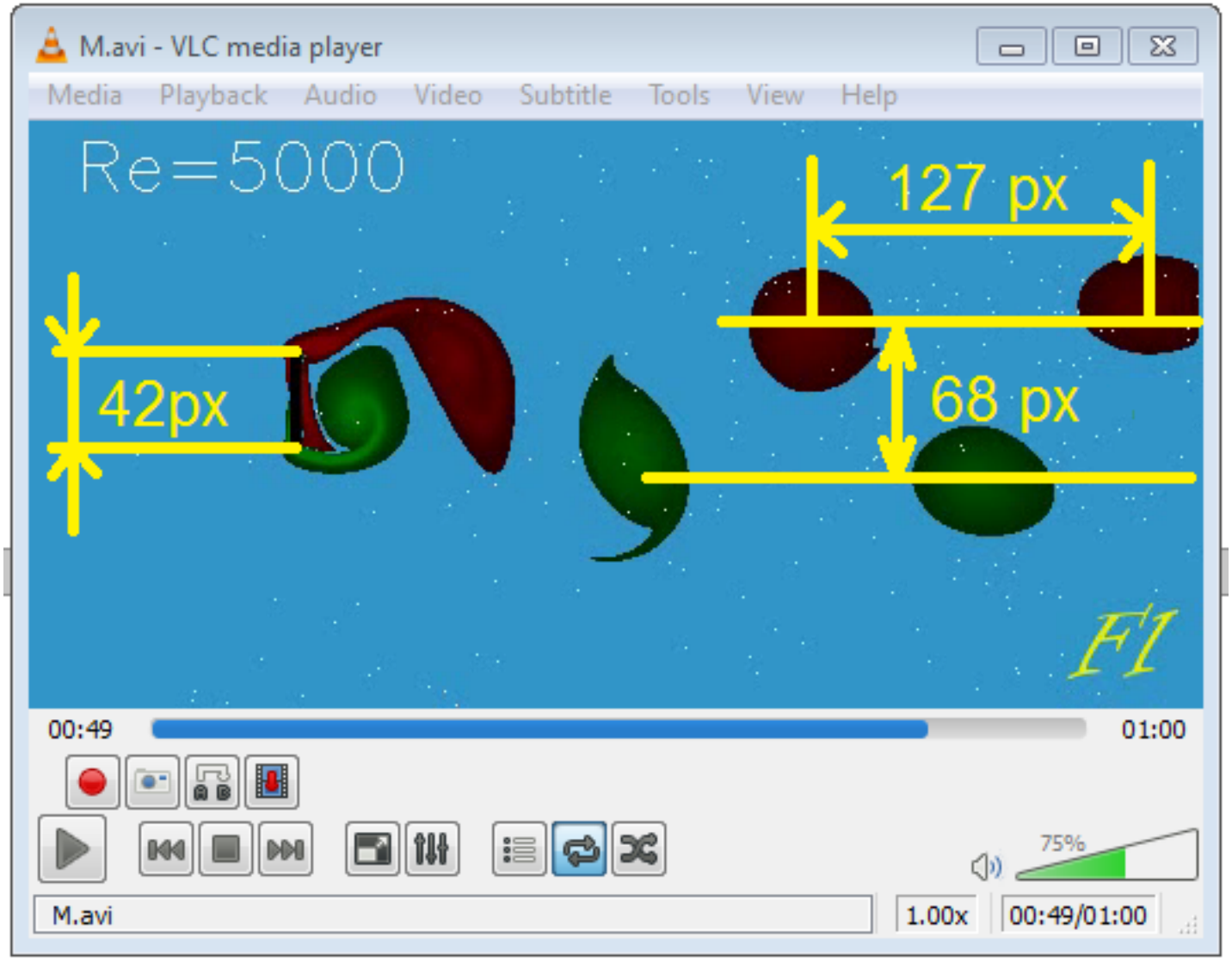
the mass of the wake has increased by *ρVTWH*

The kinetic energy of the wake has increased by *ρVTWHU2/2.*

The work of the drag force *D* was - *DVT*

Hence $D = \rho VWHU^2/2$.

Measuring the wake



Estimating the velocity in the wake

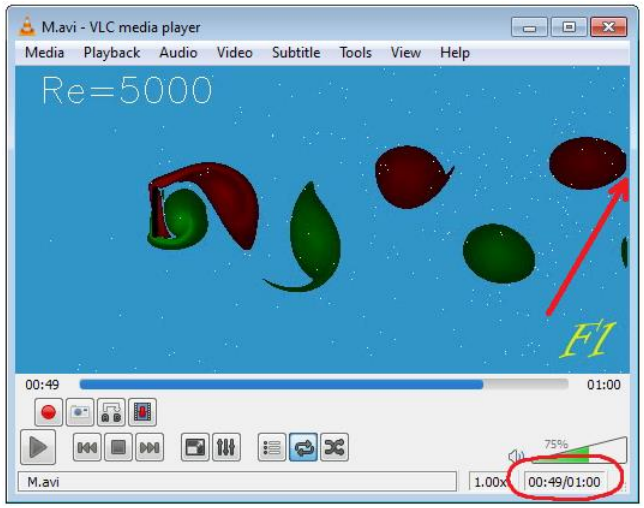


Fig.L10 The wake at the 49th second.

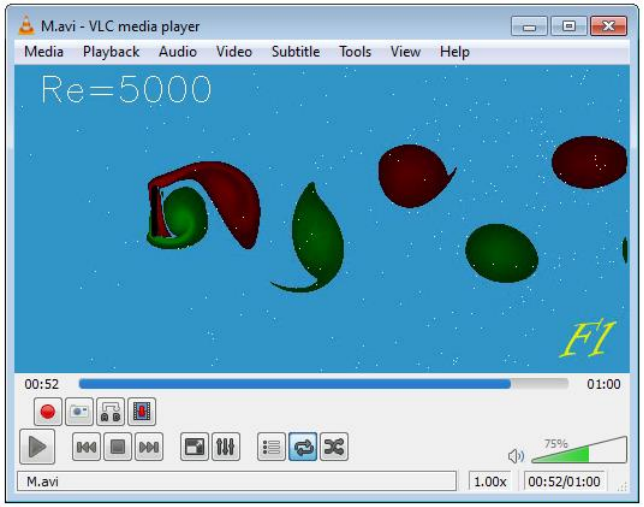


Fig.L11 The wake at the 52nd second.

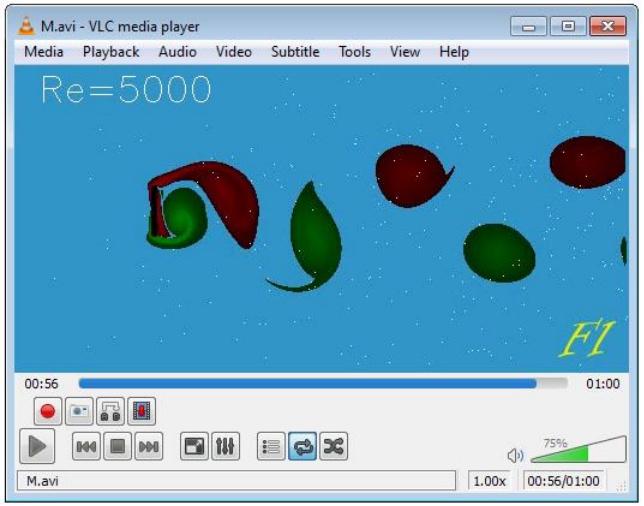


Fig.L12 The wake at the 56th second.

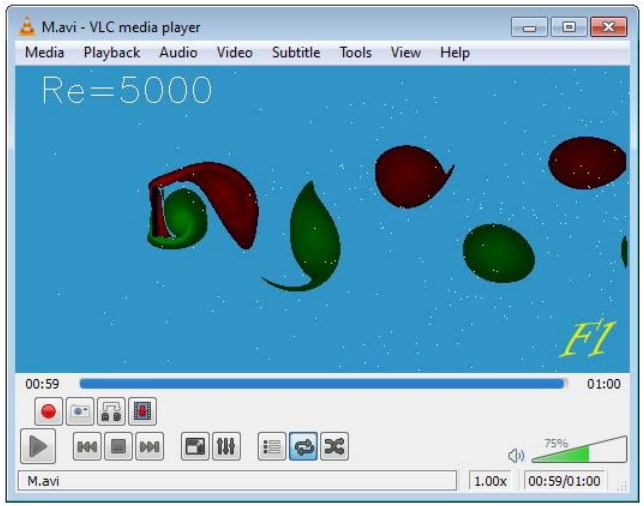


Fig.L13 The wake at the 59th second.

End