Friction Basic Concepts

When a body is moving on a surface there is always a friction force opposing the movement whose value depends on the surface finishing and lubrication.

The limit static friction force ($F_{SL}$) of a body on a surface is the maximum value of the force applied to the static body just before starting the movement. The movement starts when that value is reached.

The static friction force ($F_S$) is the applied force before the limit static friction force is reached (no movement).

Kinetic friction force ($F_k$), kinetic friction coefficient ($\mu_k$), normal reaction force (N)

$$F_k = \mu_k \cdot N$$

$\mu_k$ – depends on the body material and surface finishing and lubrication

- steel on steel - $\mu_k = 0.57$
- aluminum on steel - $\mu_k = 0.47$
- rubber on concrete - $\mu_k = 0.8$
- wood on wood - $\mu_k = 0.2$
The friction force in the moving surface is a function of the body shape, the fluid viscosity and the body velocity: 
\[ F_v = b \cdot v \]

- \( F_v \) is the coefficient of viscous friction and 
- \( v \) is the body velocity.

Friction force as a function of velocity, is the sum of two components:
- Kinetic friction force \( (F_k) \)
- Viscous friction force \( (F_v) \)

Note: Pictures from internet resources