

1.5 汽车功率平衡 MV power balance

汽车行驶时驱动力与阻力平衡

发动机输出功率也与行驶阻力功率平衡

定义：用纵坐标表示功率，横坐标表示车速，将发动机功率与经常遇到的阻力功率对车速的关系绘制在直角坐标图上，就得到功率平衡图。

$$P = Fu$$

$$P_e = \frac{1}{\eta_T} \left(mgf \cos \alpha + mg \sin \alpha + \frac{C_D A u_a^2}{21.15} + \delta m \frac{du}{dt} \right) \frac{u_a}{3600}$$
$$= \frac{1}{\eta_T} \left(\frac{mgf u_a \cos \alpha}{3600} + \frac{mg u_a \sin \alpha}{3600} + \frac{C_D A u_a^3}{76140} + \frac{\delta m u_a}{3600} \frac{du}{dt} \right)$$

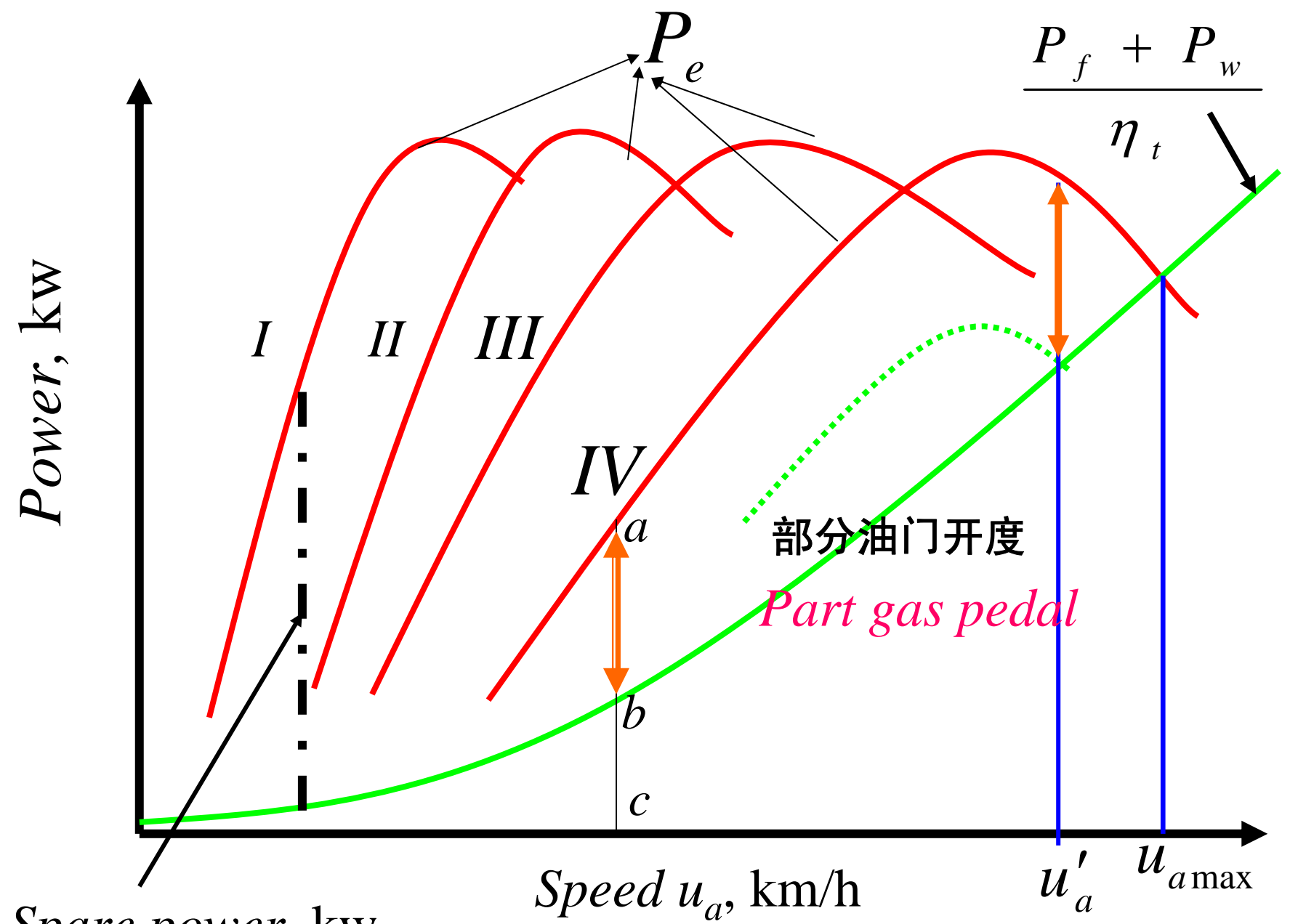


The traction and resistance balances when the MV drives

The engine power output also balances with the driving resistance power.

Definition: let vertical coordinate as the power, horizontal coordinate as MV speed, draw diagrams of the engine power and the resistance power to coordinate system in the right angle, then get the equilibrium diagram of power.

$$P_e = \frac{1}{\eta_T} \left(mgf \cos \alpha + mg \sin \alpha + \frac{C_D A u_a^2}{21.15} + \delta m \frac{du}{dt} \right) \frac{u_a}{3600}$$
$$= \frac{1}{\eta_T} \left(\frac{mgf u_a \cos \alpha}{3600} + \frac{mg u_a \sin \alpha}{3600} + \frac{C_D A u_a^3}{76140} + \frac{\delta m u_a}{3600} \frac{du}{dt} \right)$$



Spare power, kw

2011-11-7 后备功率

说明

- ☆ 挡位不同时，车速的范围不同，但功率大小不变，只是各挡功率曲线对应车速位置不同；低挡时车速低，速度变化区域窄；高挡时车速高，所占速度变化区域大。
- ☆ 滚动阻力功率在低速时为直线，而在高挡时是二次曲线。
- ☆ 空气阻力功率曲线为三次函数。
- ☆ 在低速时以滚动阻力功率为主，而在高速时以空气阻力功率为主。

The MV speed is different as different gears, but the value of the power is constant, is just the position of the power curve of each gear in the coordinate; because the MV operates at low gear, the speed variety district is narrow; otherwise, because the speed is higher, the speed variety district is wider.

Rolling resistance power at low speed is a straight line, but at higher gear is two orders curve.

The air resistance power curve is three orders function.

At low speed ,the rolling resistance power is main factor, but at high speed, the air resistance power is main one.

后备功率定义： Surplus power definition

$$P_s = P_e - \frac{1}{\eta_T} (P_f + P_w)$$

后备功率是发动机功率与常见阻力功率之差。汽车后备功率越大，汽车动力性越好。利用后备功率也可确定汽车的爬坡度和加速度。

The spare power is larger, the performance is better. Making use of the spare power can also make sure the gradient of MV slope and accelerations.

由功率平衡可了解汽车行驶时发动机负荷率，有利于分析汽车燃料经济性。

The power balance is also used to the engine load rate as MV drives, be advantageous to analyze the fuel economy.