

## 柴油机燃烧过程模拟分析

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收稿日期 2006-9-17 修回日期 网络版发布日期 2007-8-27 接受日期

**摘要** 为了解柴油机燃烧的微观情况,

利用商用计算软件STAR CD对增压中冷柴油机进行了燃烧模拟分析。在试验台架上调整供油提前角,

针对烟度及NO<sub>x</sub>排放性能进行了试验, 为模拟计算获取了温度、

压力等初始条件。对试验工况进行了燃烧模拟, 结果表明, 喷油过程会形成喷注头部,

在喷油后期喷注尾部又从喷注整体上脱落; 未来得及燃烧的燃油撞壁后,

其小部分向上运动逐渐进入余隙狭缝之中,

大部分向下沿 $\omega$ 形壁面形成滚流运动; 着火首先发生在油束外缘区域, 并且随着燃烧的进行,

高温区一直出现在燃油蒸汽的外层。

**关键词** [动力机械工程](#), [柴油机](#), [供油提前角](#), [燃烧模拟](#), [STAR-CD](#)

**分类号** [TK421.2](#)

## Simulation of diesel engine combustion process

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### Abstract

In order to understand the details of the diesel engine combustion process, the combustion of a turbocharged and intercooled diesel engine was simulated with the commercialized computational fluid dynamics software STAR CD. To define the initial conditions of the simulation, such as pressures, temperatures, etc., the diesel engine was tested on a dynamometer testbed under different fuel supply advance angles to get its smoke and NO<sub>x</sub> emission behaviors. The combustion processes were simulated under the testing conditions. The simulation results show that a fuel spray tip is formed during the fuel injection process, and the spray tail breaks off from the main spray towards the end of injection. The unburned fuel impinges on the combustion chamber wall, then a part of which moves up into the clearance space between the piston top and the cylinder head bottom, and the majority of the impinged fuel moves down along the  $\omega$  type chamber wall to form a tumble flow. The ignition always occurs in the outer region of the fuel spray, the combustion goes on there, so the temperatures there are high.

**Key words** [power machinery and engineering](#) [diesel engine](#) [fuel supply advance angle](#) [combustion simulation](#) [STAR-CD](#)

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