CONVERGE在潍柴发动机燃烧系统开发中的应用

单位名称 潍柴动力股份有限公司

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1 仿真能力简介

WEICHAI 潍柴

性能开发仿真室

- 2013.10月至今，使用CONVERGE （v2.1~2.2)
- 应用领域：燃烧计算和流动计算

CONVERGE

■ 燃烧计算

- 燃烧室优化
- 喷油器选型
- 涡流比确定
- 燃烧系统优化
- 缸内燃烧过程分析

■ 流动计算（摸索阶段）

- 气道稳流评估
- SCR流动计算
- 一三维耦合管路计算

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2 燃烧系统开发

燃烧系统优化

- 燃烧室优化
- 喷油器选型
- 涡流比确定
- 燃烧系统优化
- 喷油落点的计算分析
- 缸内燃烧过程分析

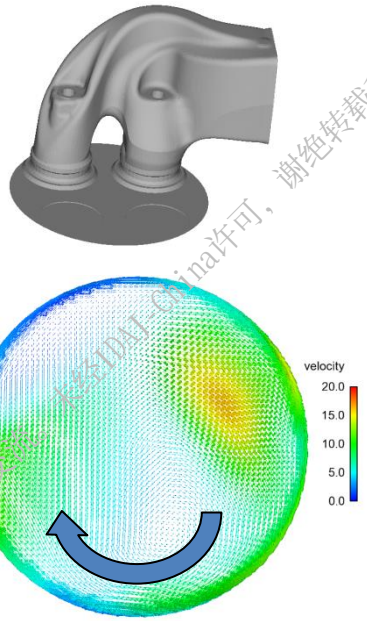


图 1 气道评估

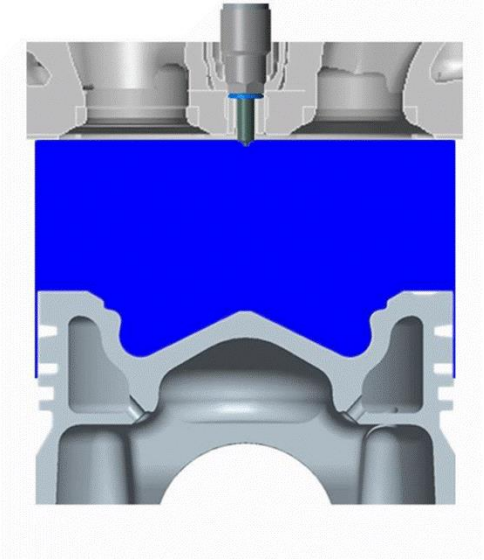


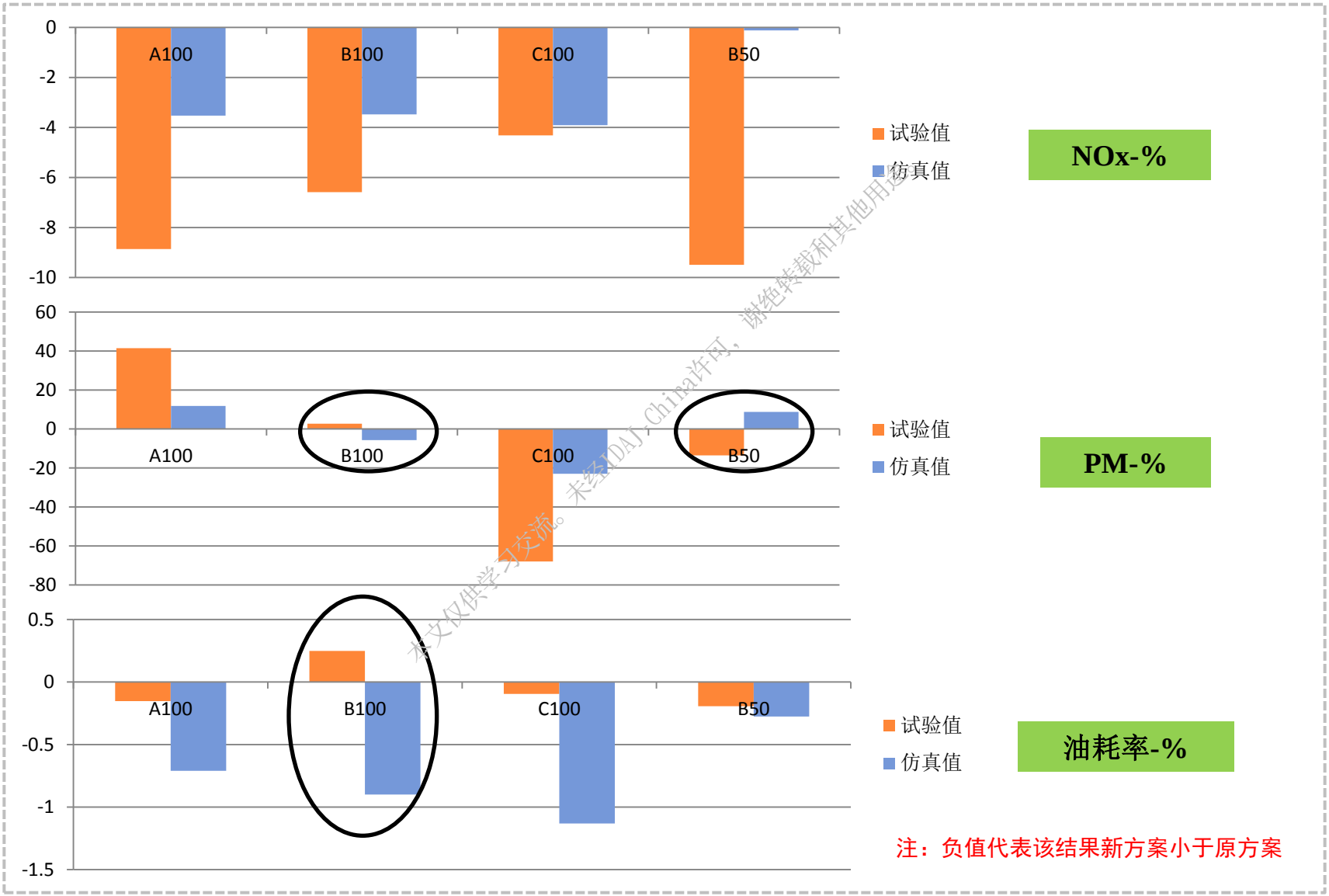
图 2 燃烧系统优化

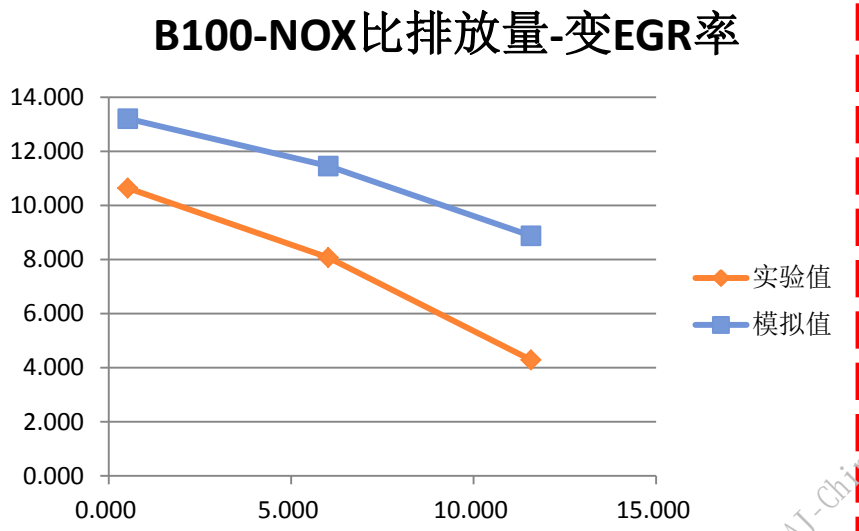
2 燃烧系统开发

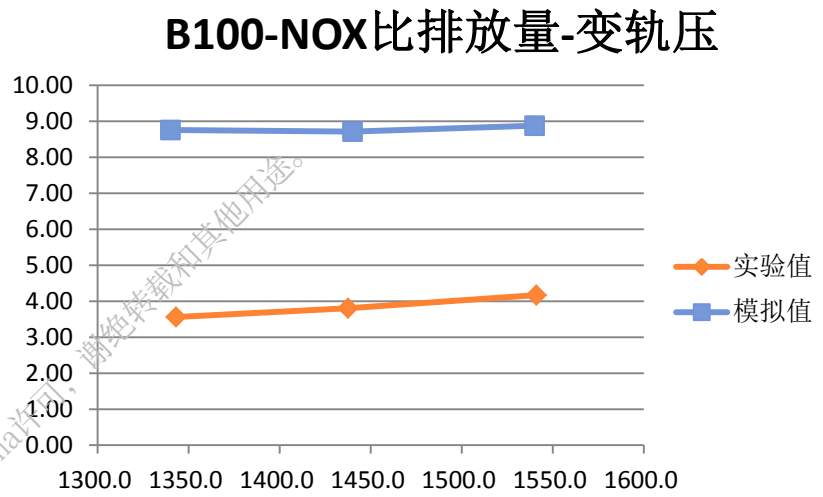
2.1 不同活塞方案结果验证

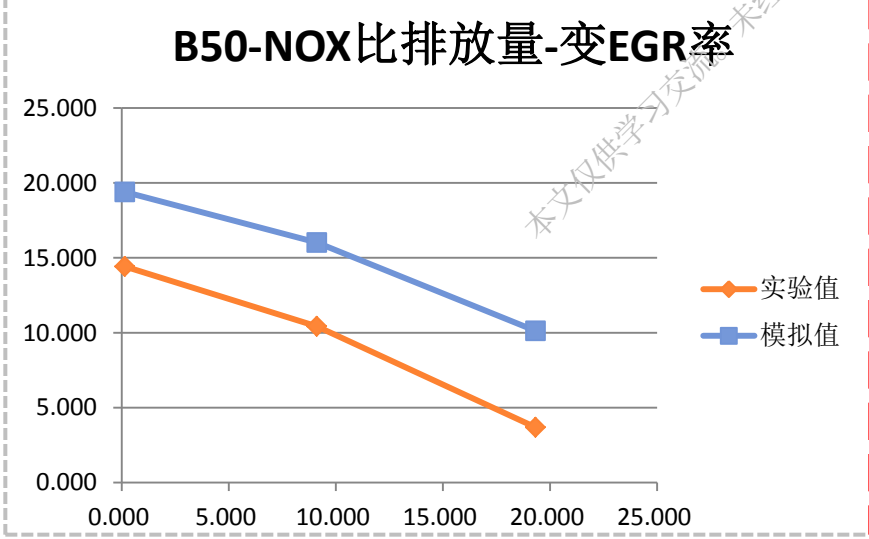
2 燃烧系统开发

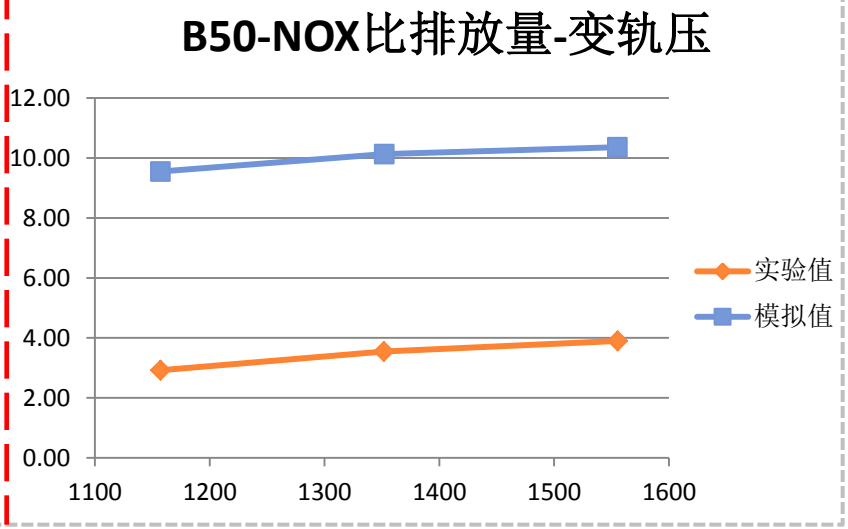
2.1 不同活塞方案结果验证

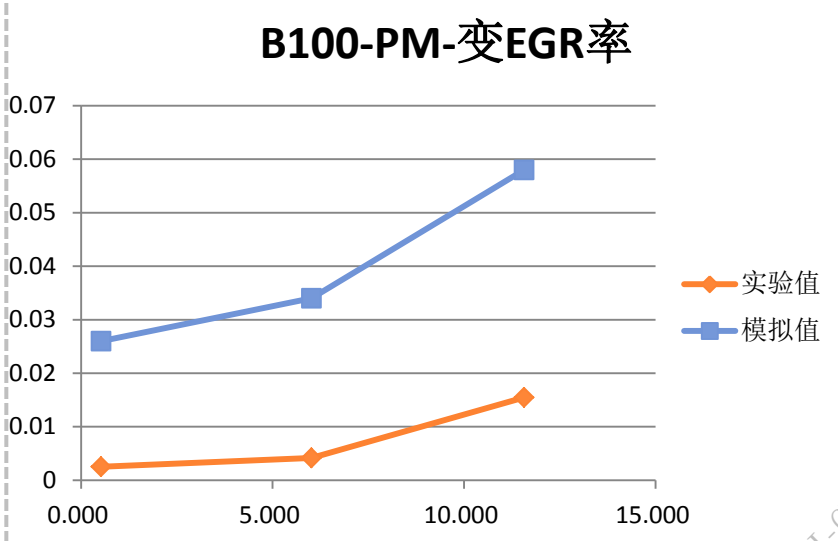


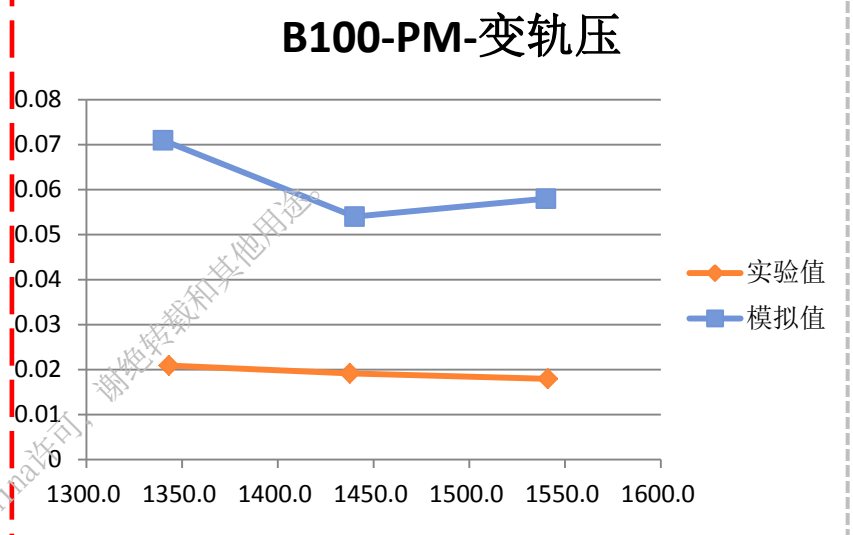


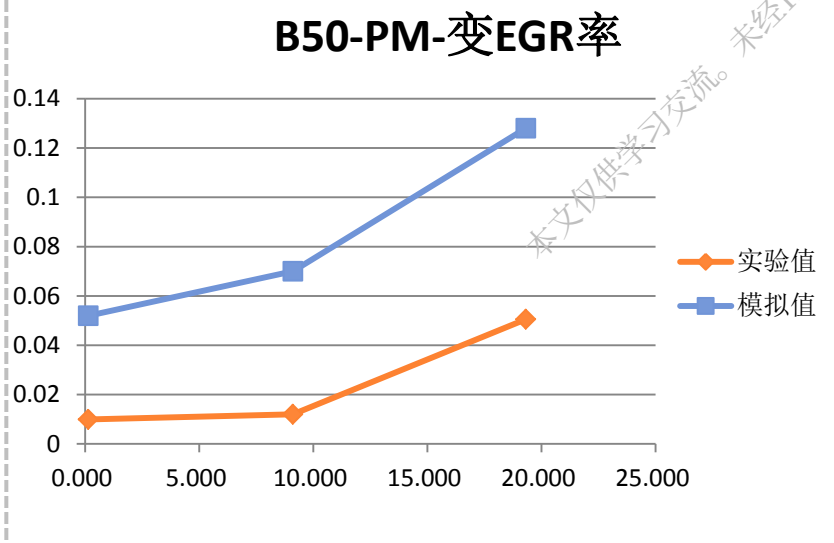


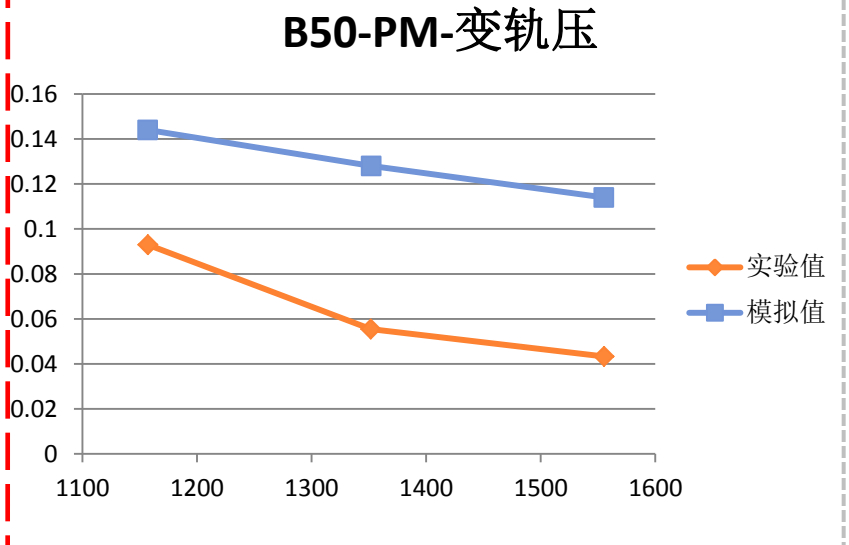






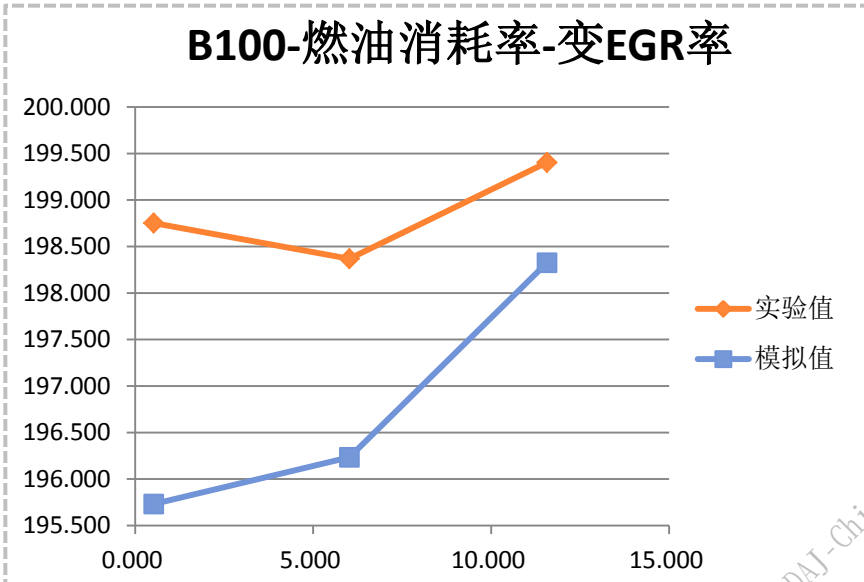


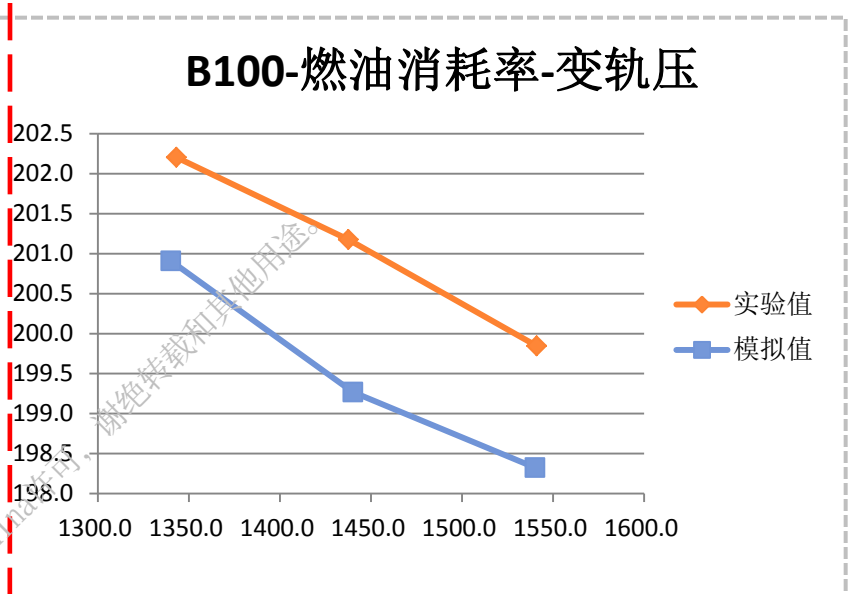


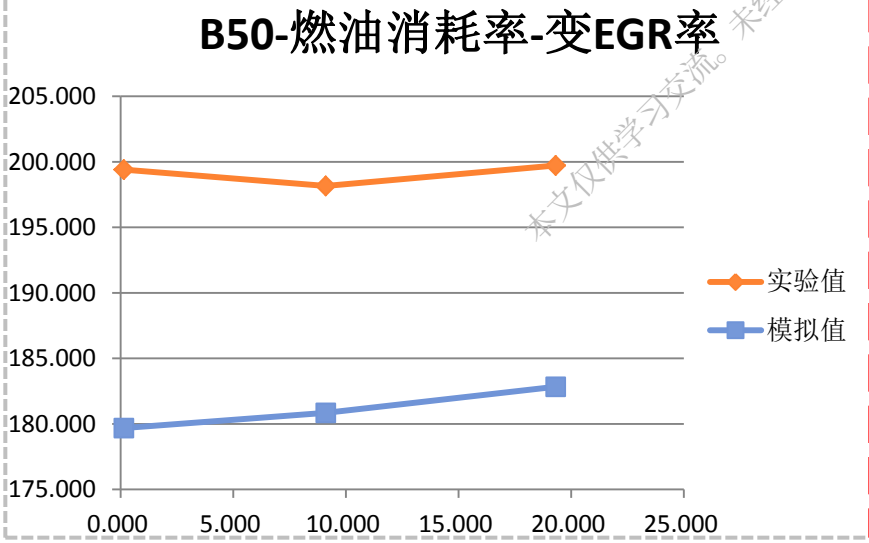


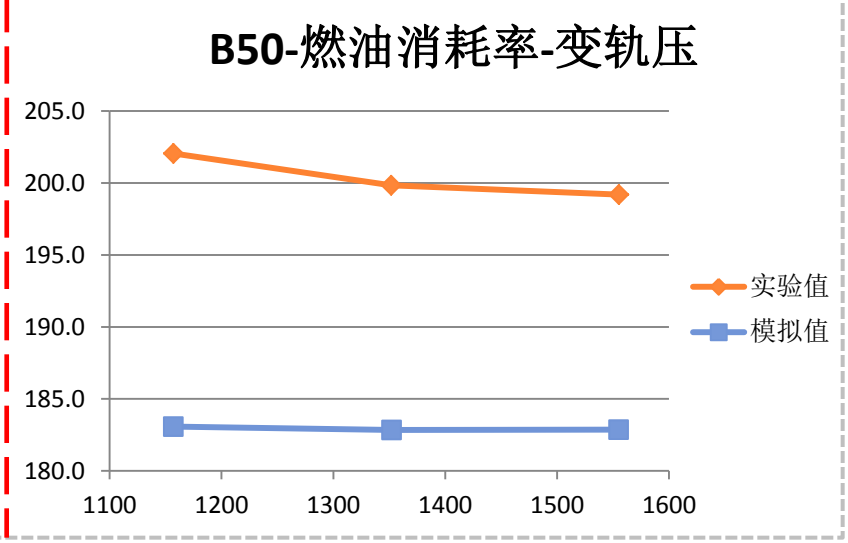
2 燃烧系统开发

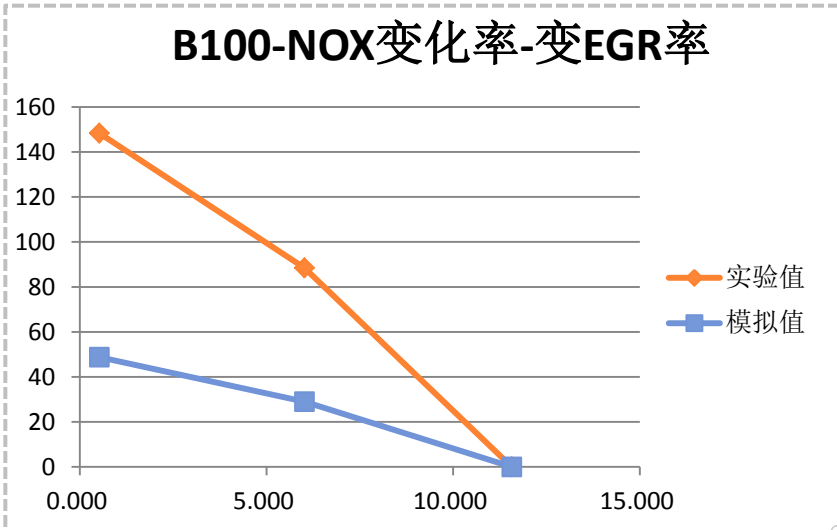
2.2 变EGR率和变轨压结果验证

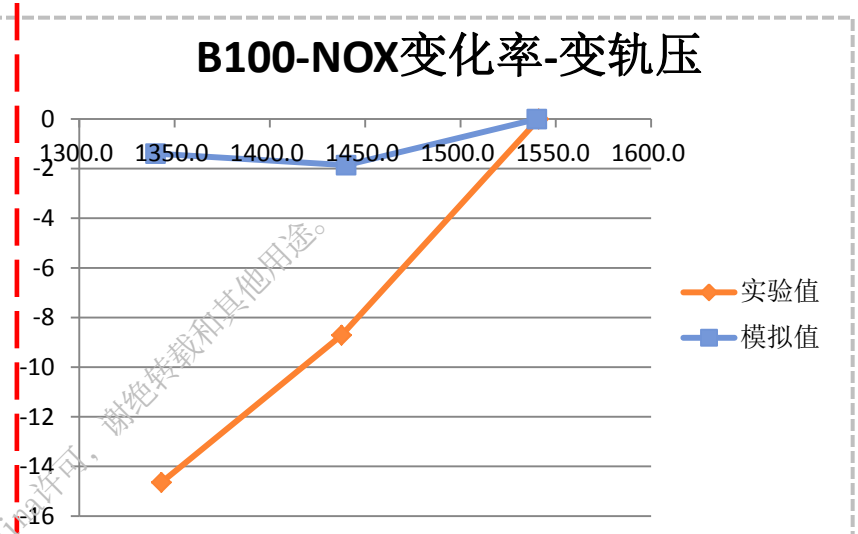


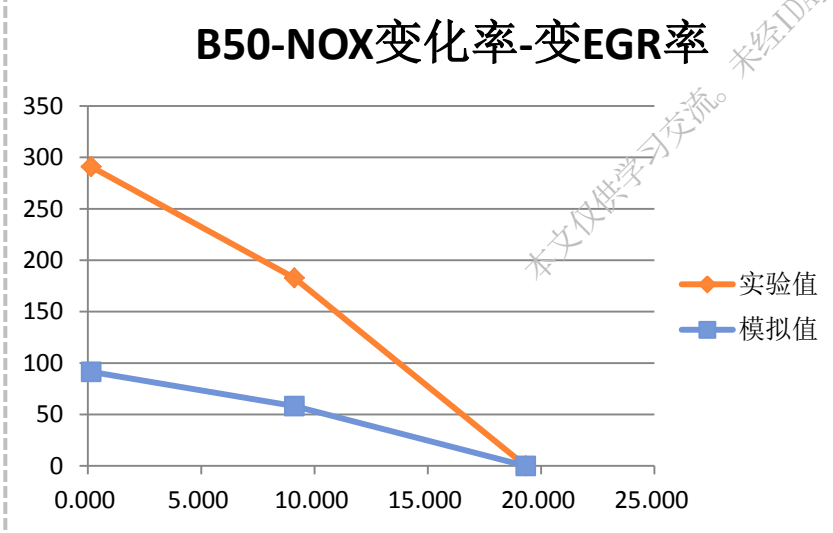


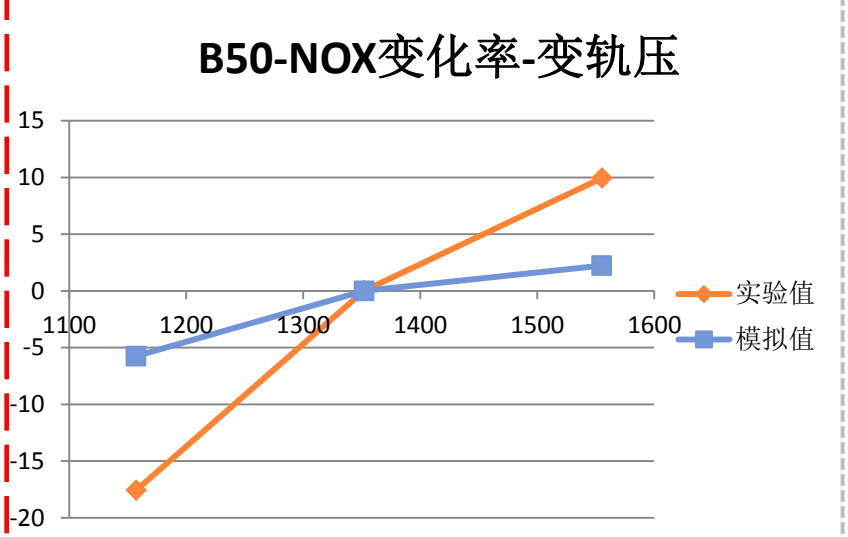


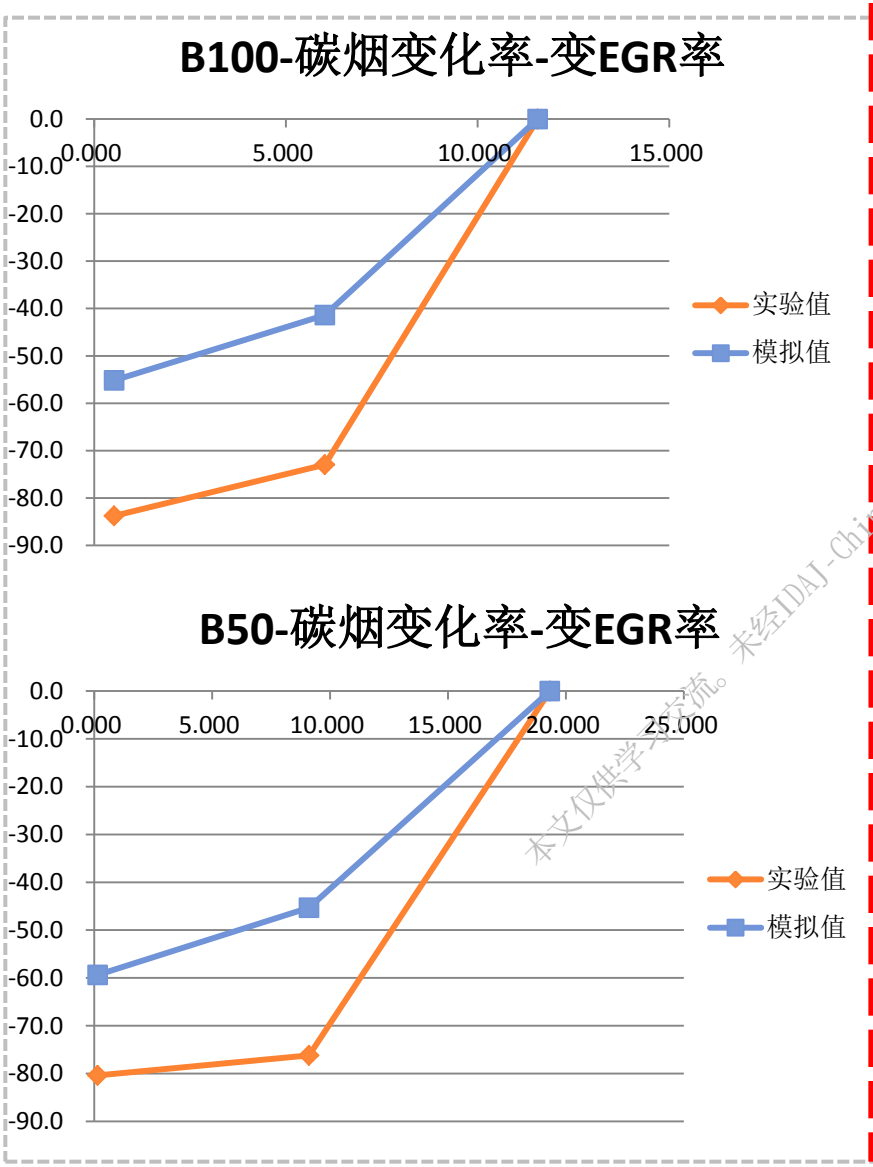


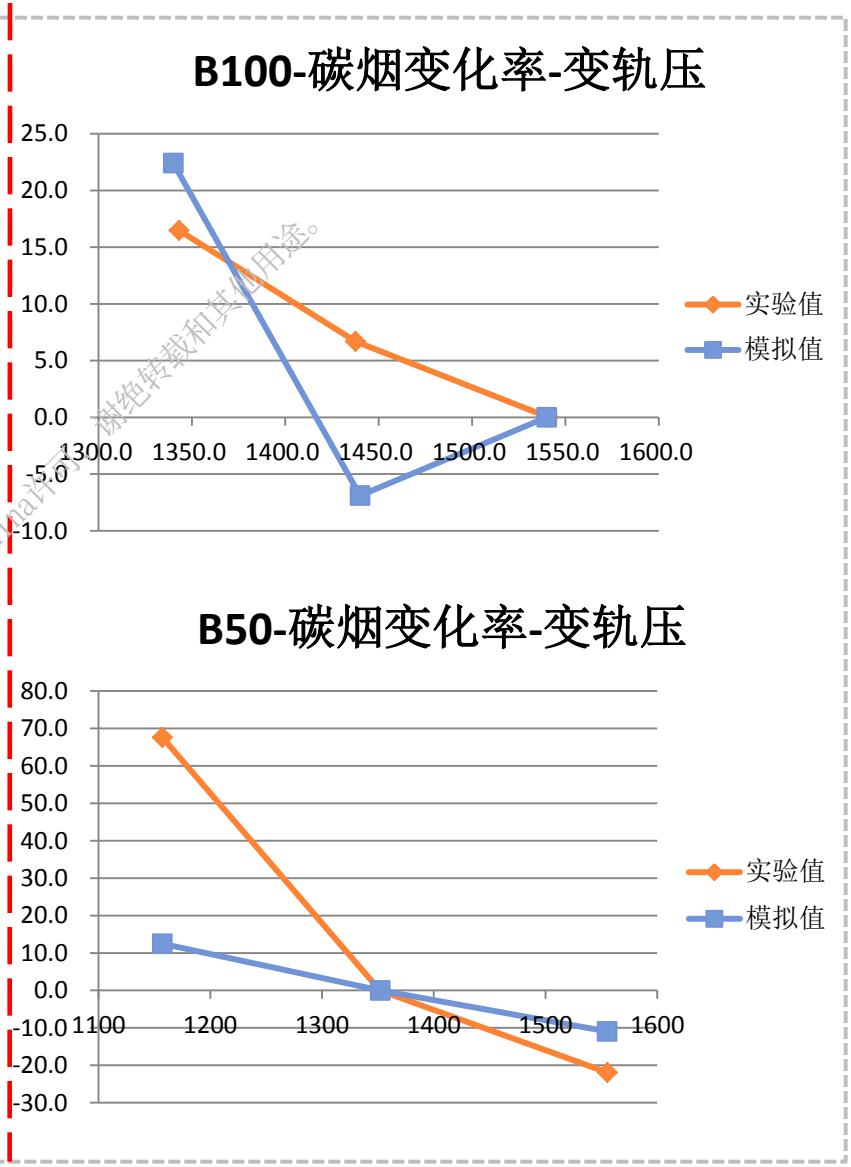


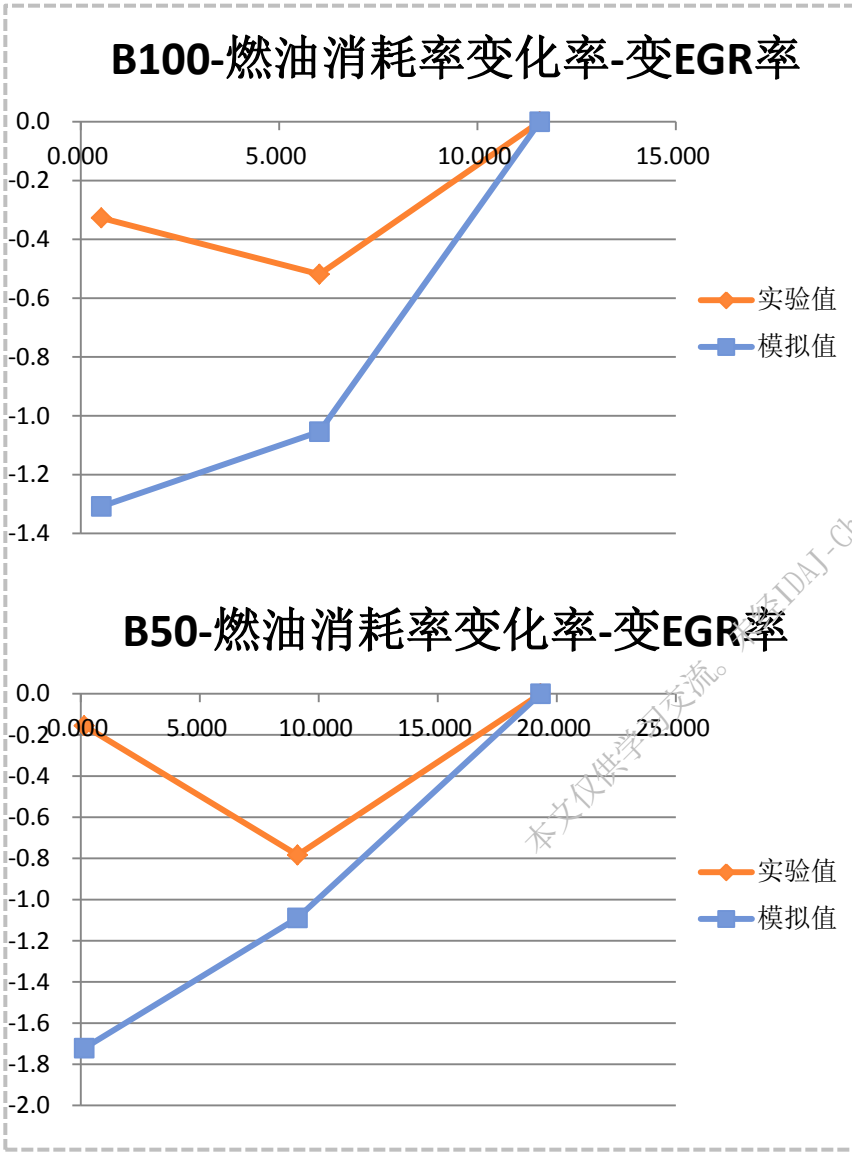


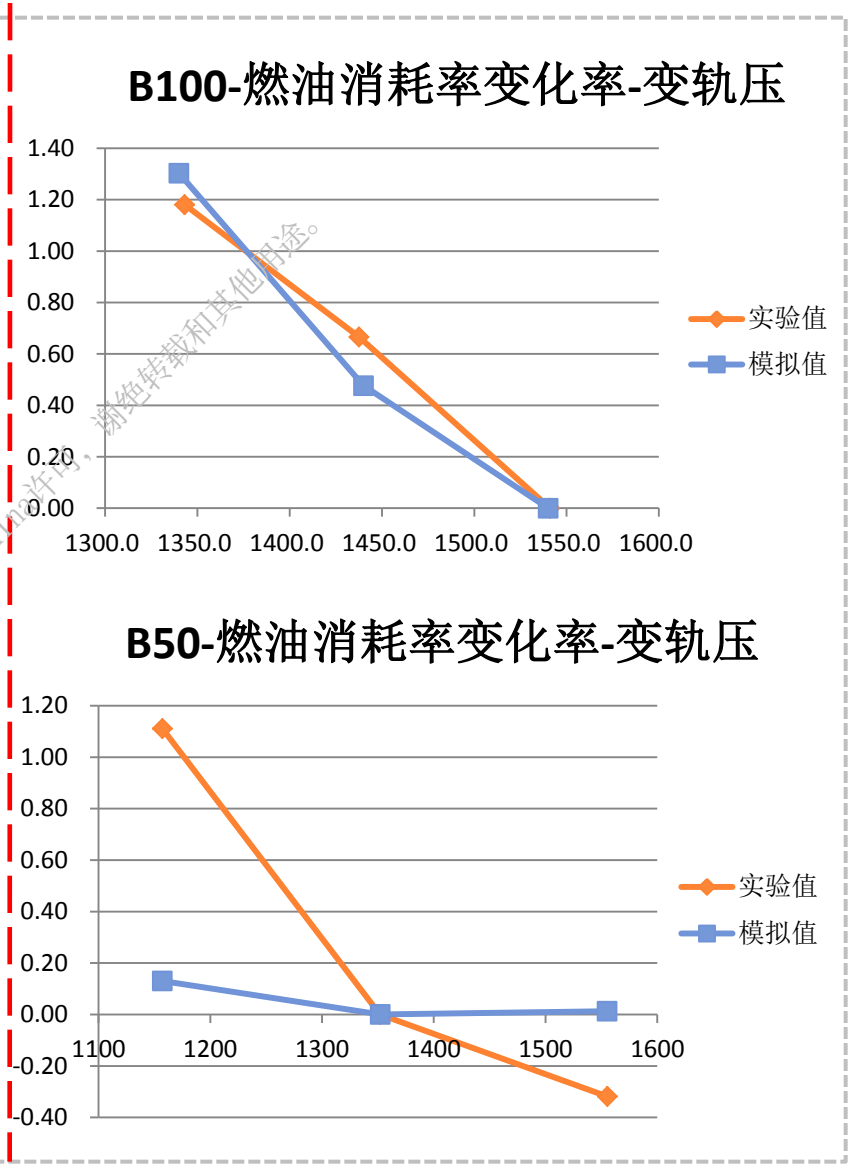


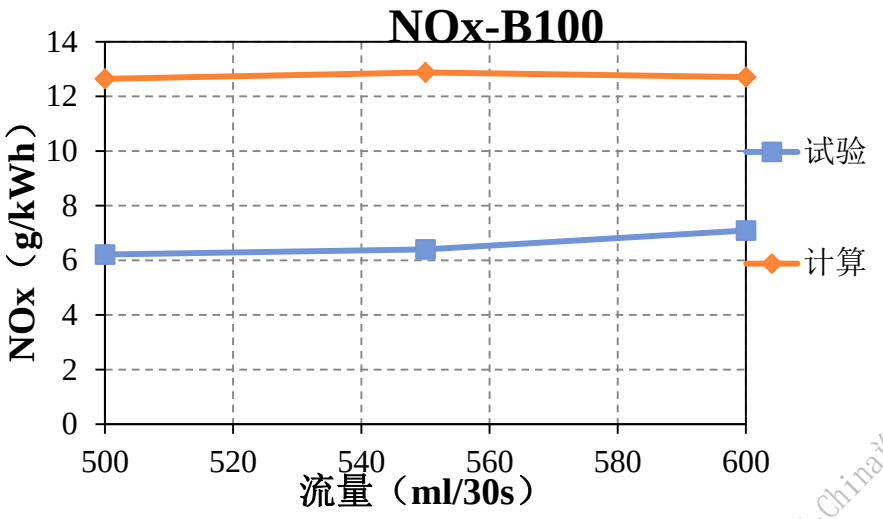


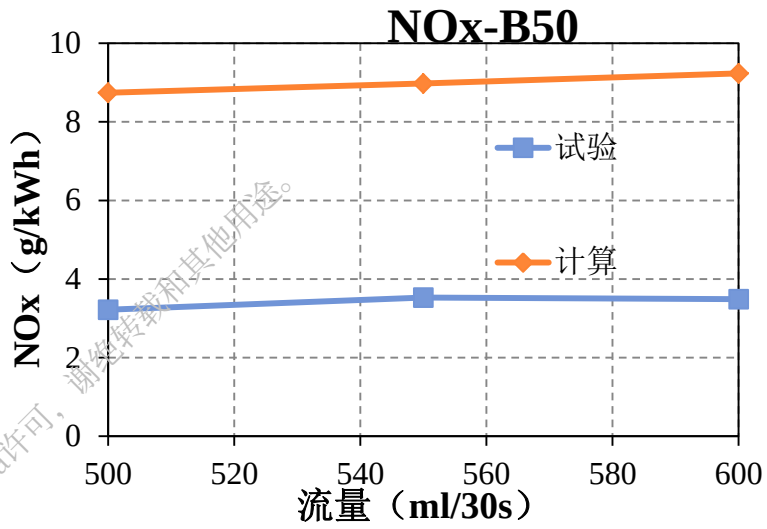


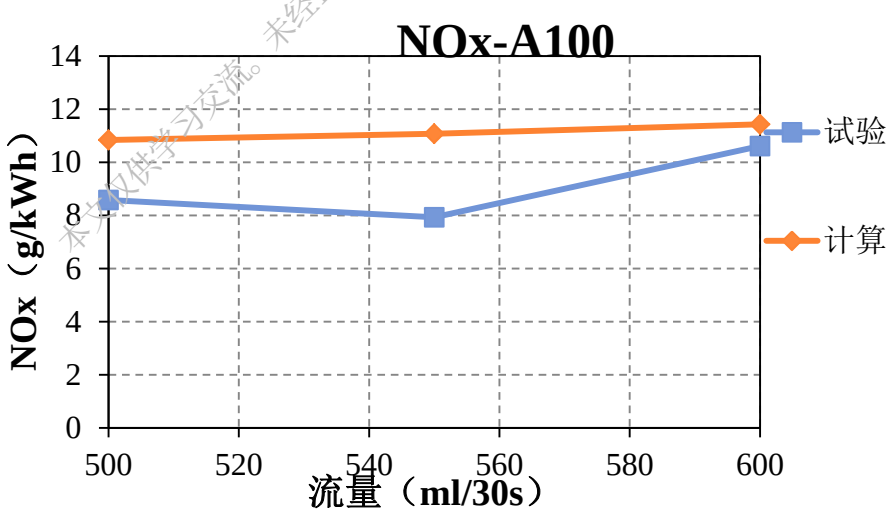


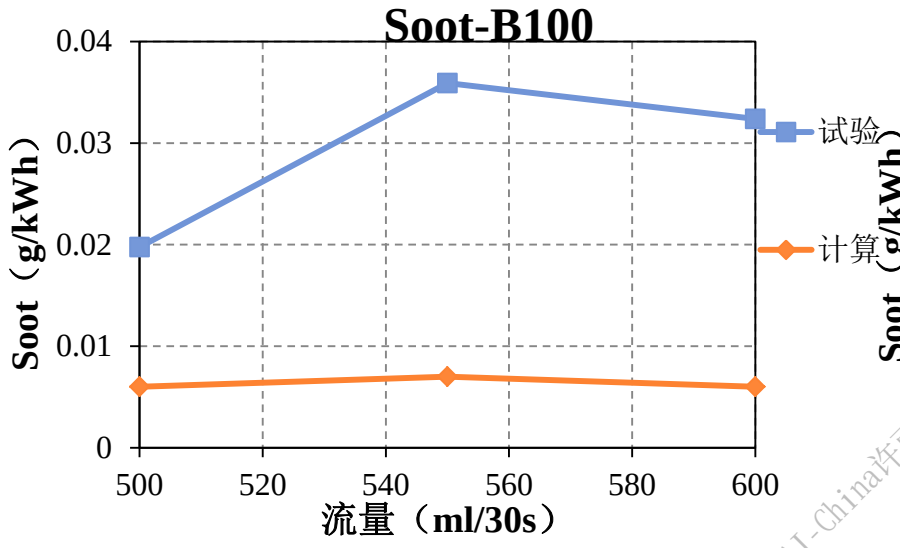


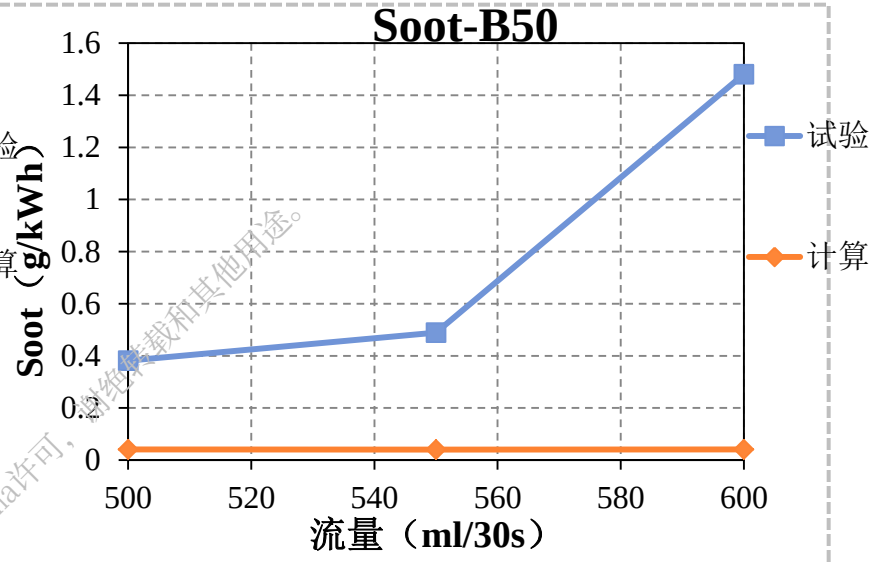


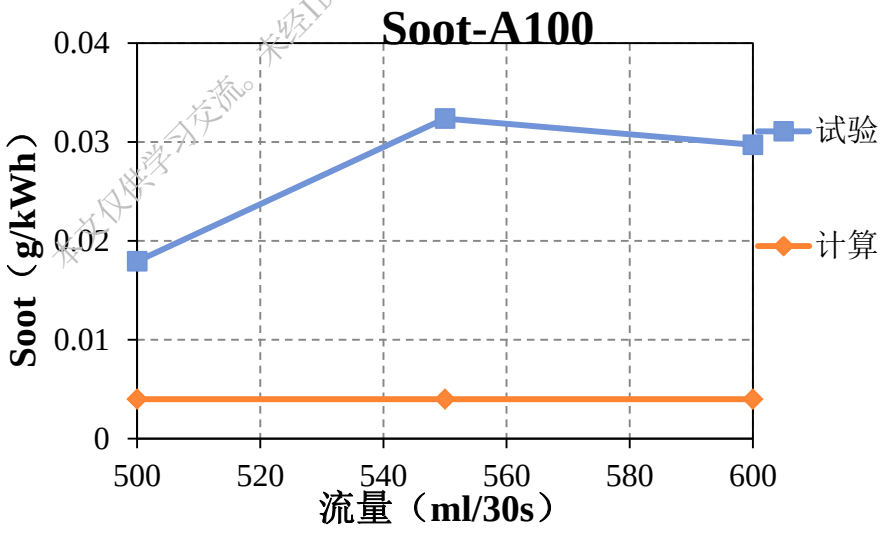


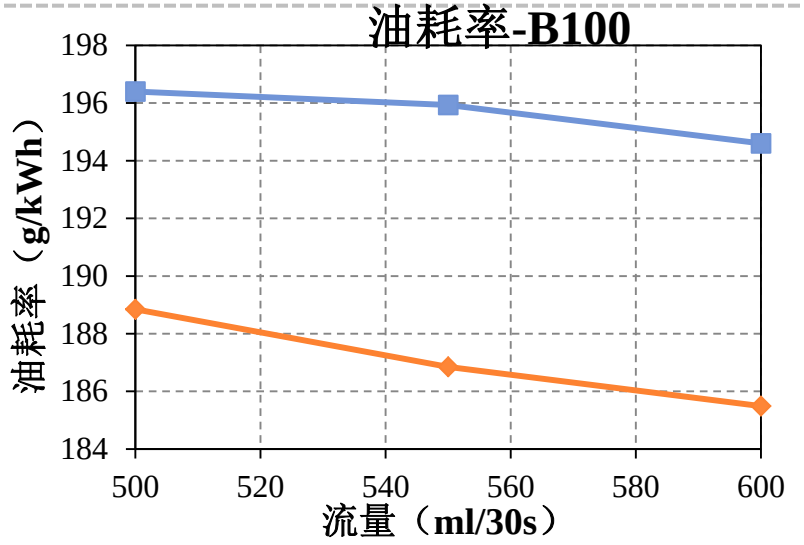


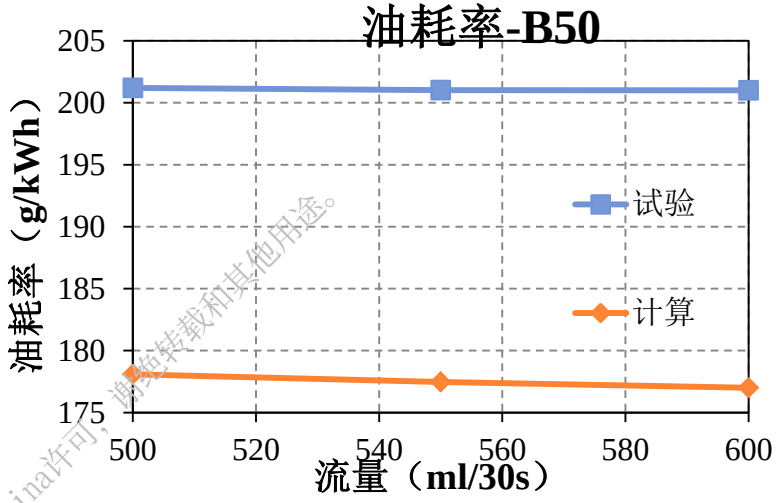


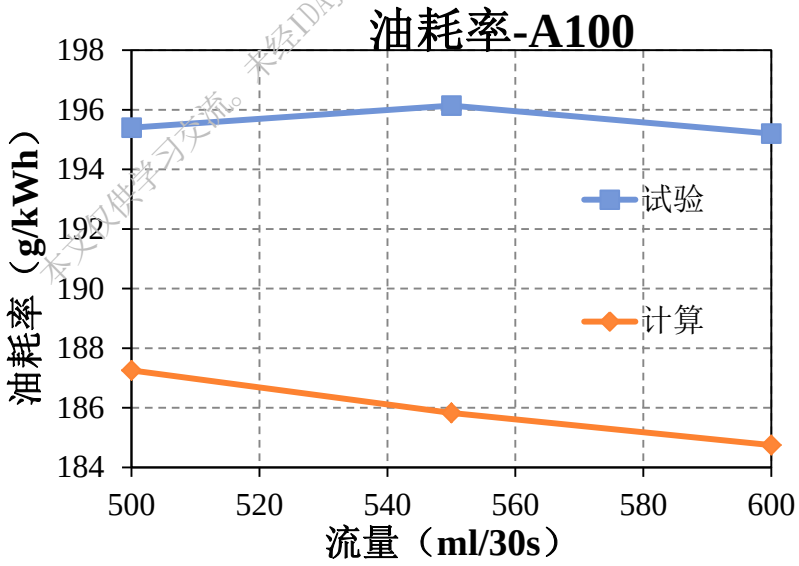


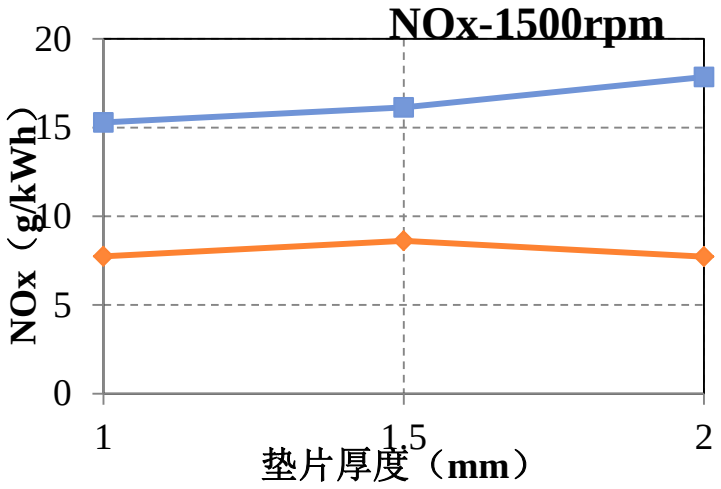


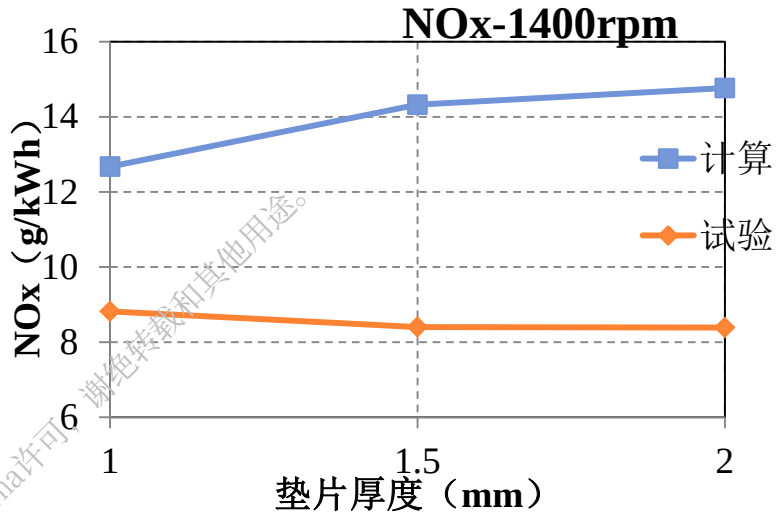


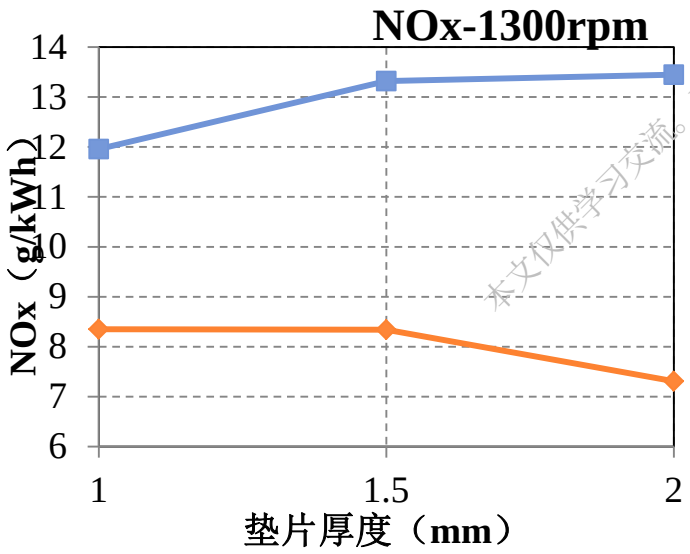


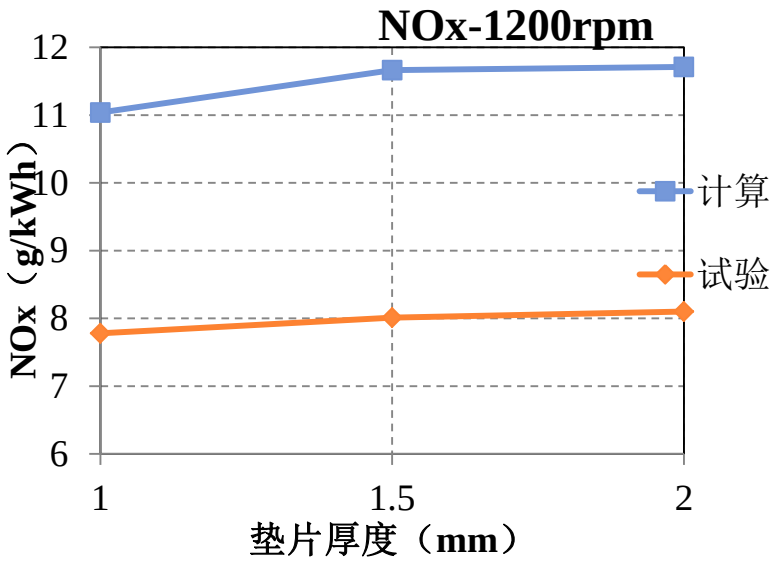


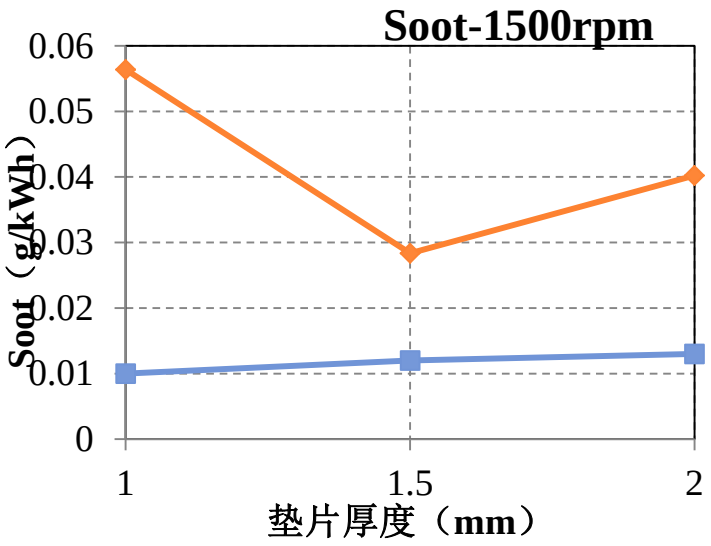


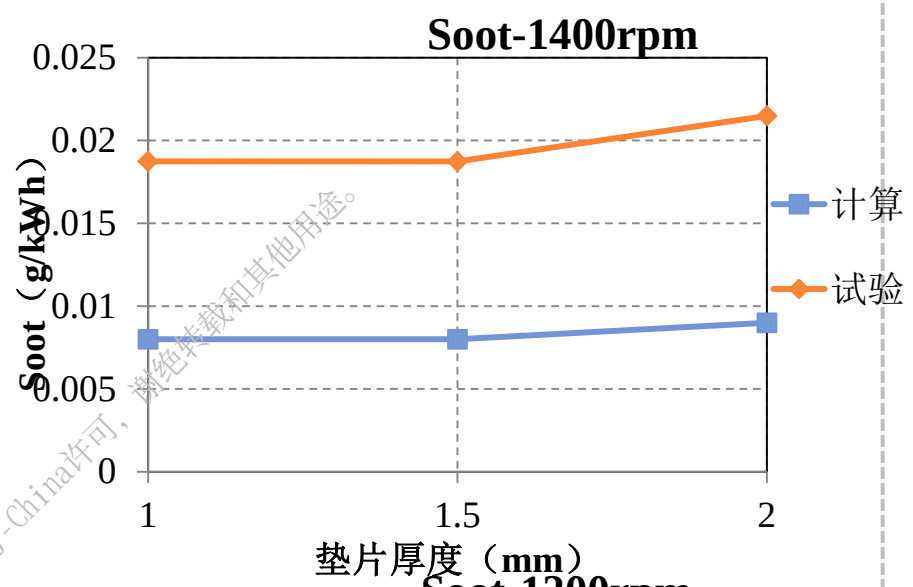


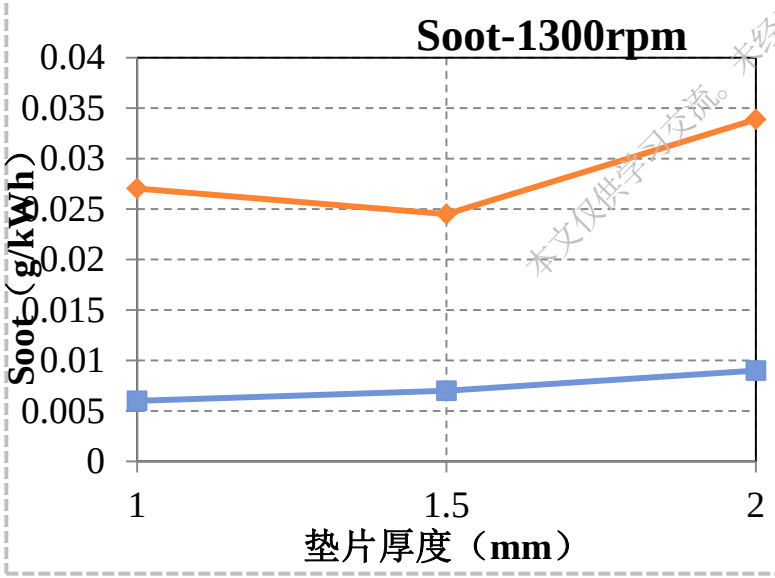


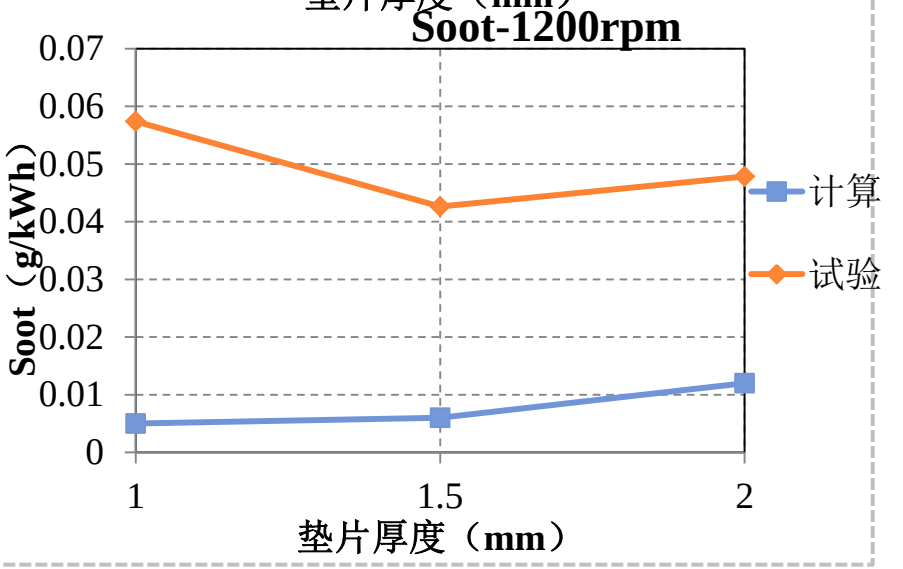


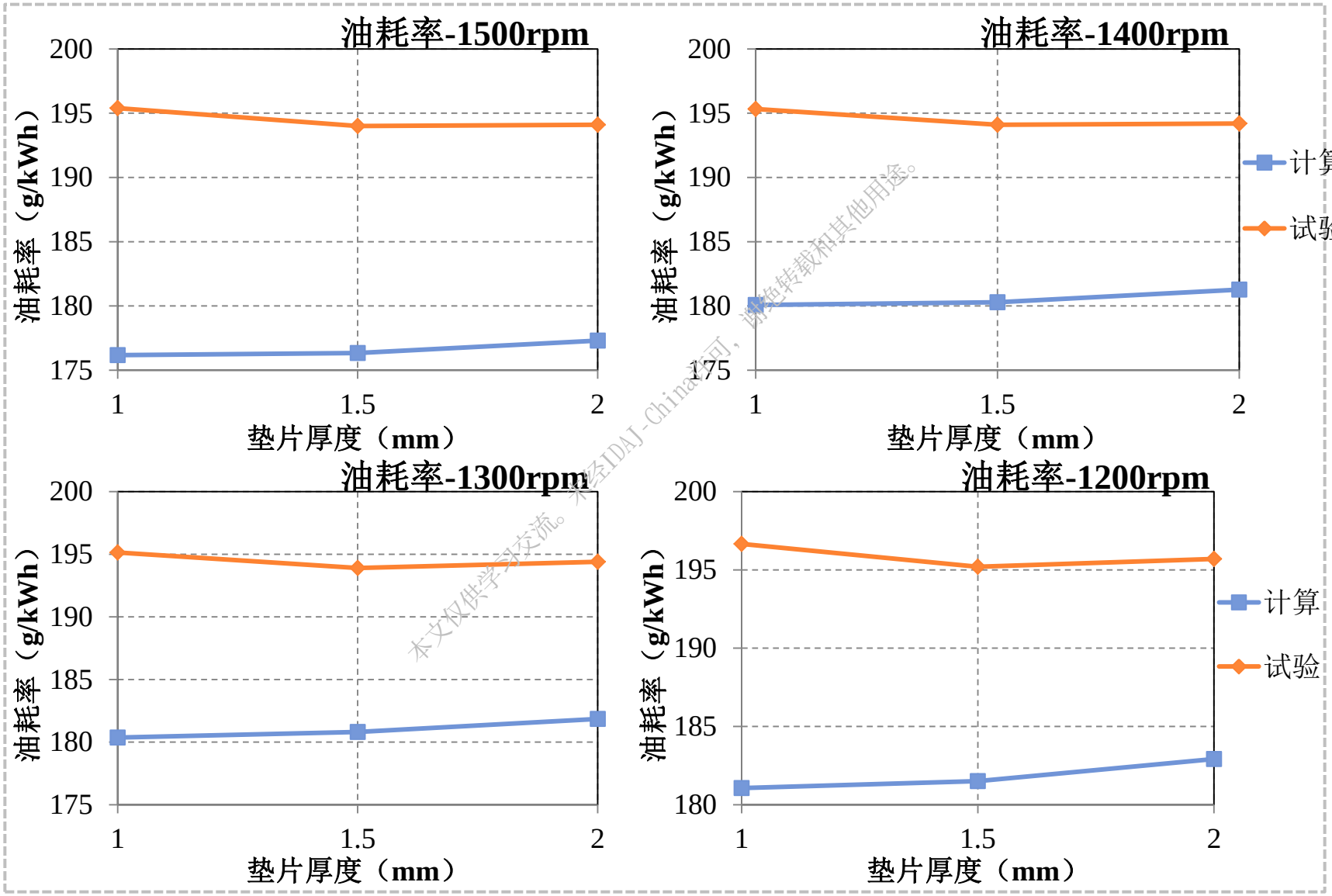












3 流动计算

- 气体机缸内流动过程分析

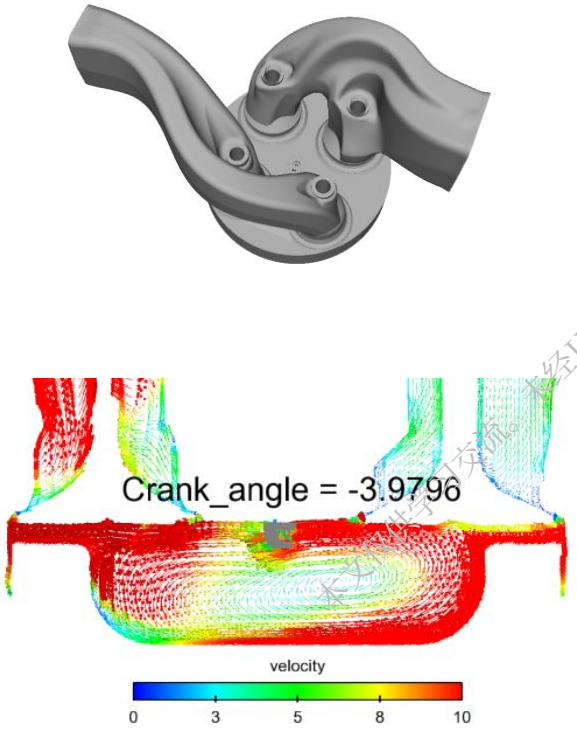


图 3 火花塞附近流动分析

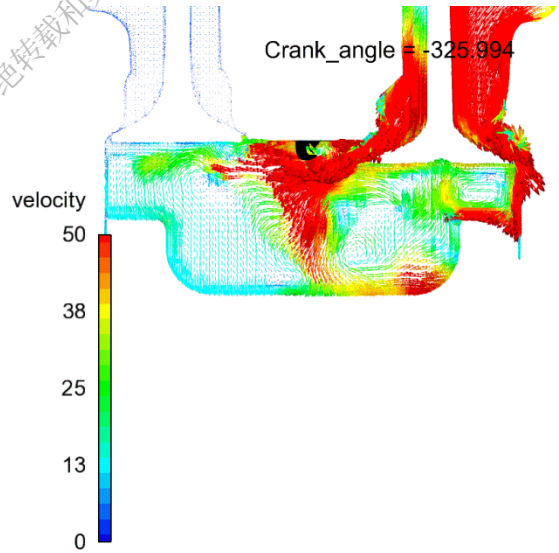


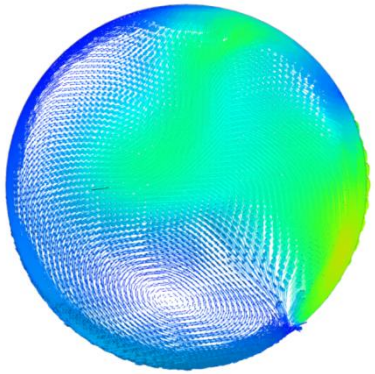
图 4 进气流动分析

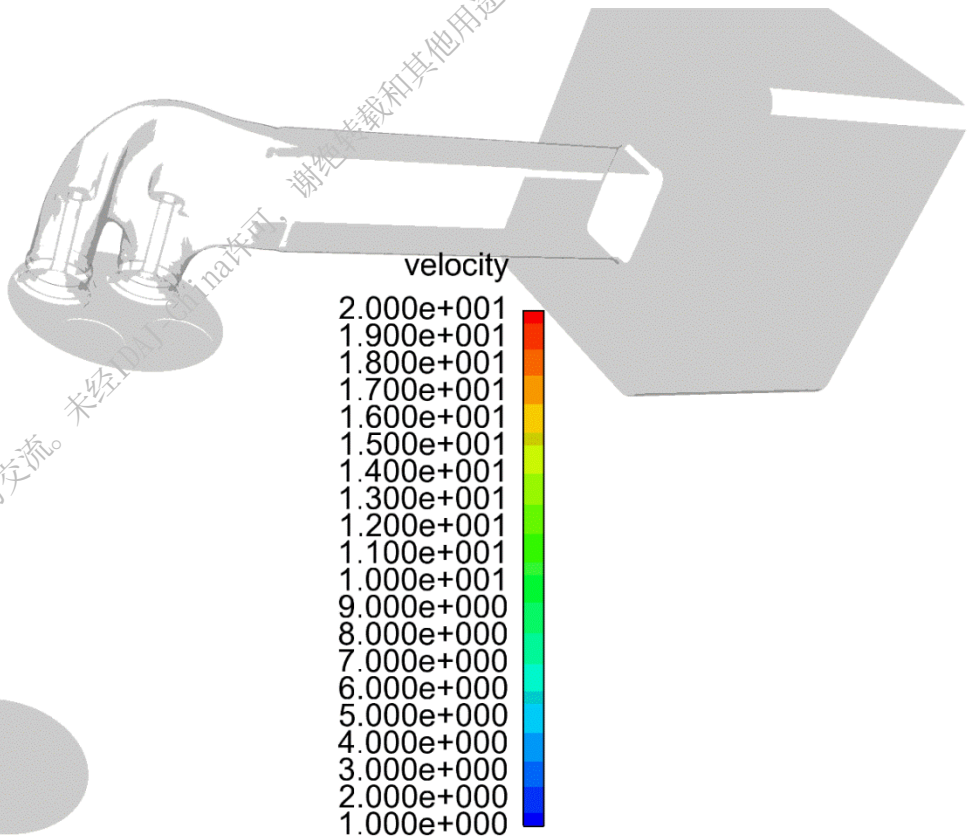
气道仿真评估

气道稳流试验台

（叶轮式）

- 涡流比
- 流量系数



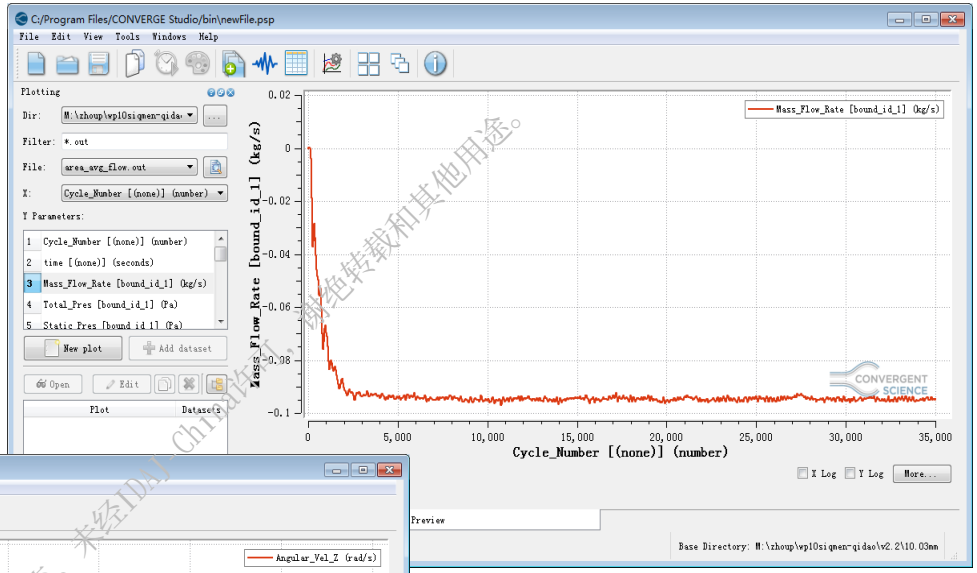


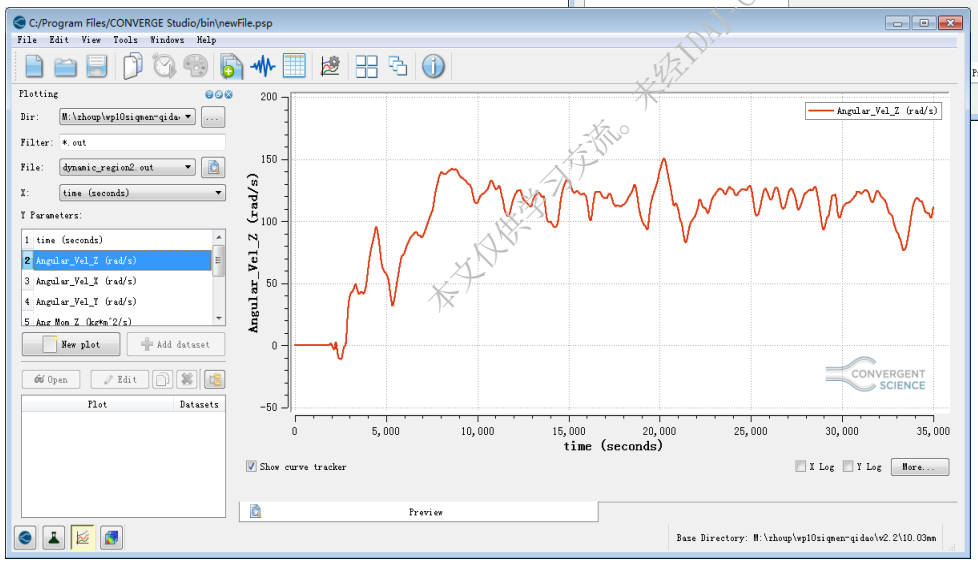
气道仿真评估

气道稳流试验台

（叶轮式）

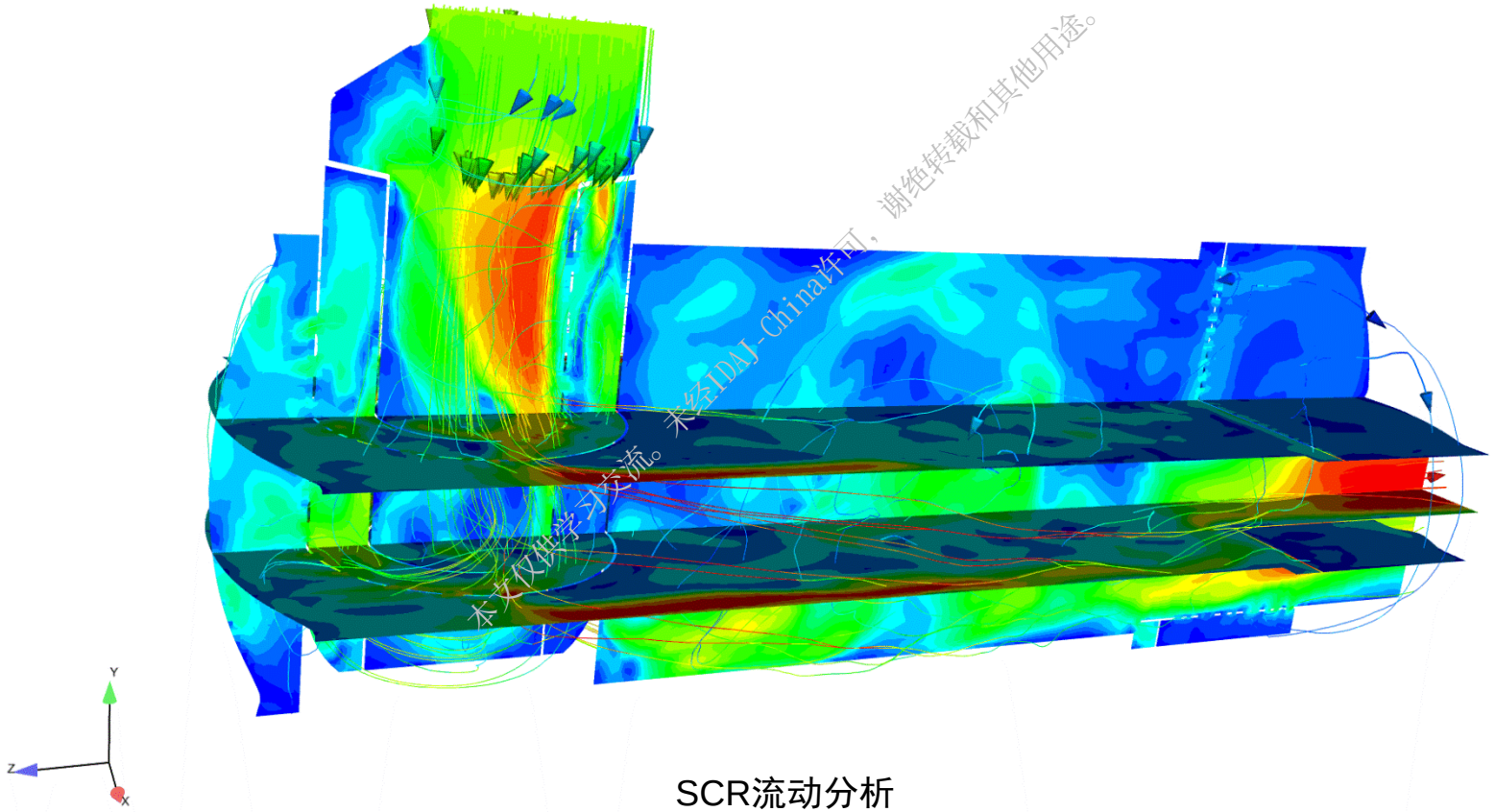
- 涡流比
- 流量系数





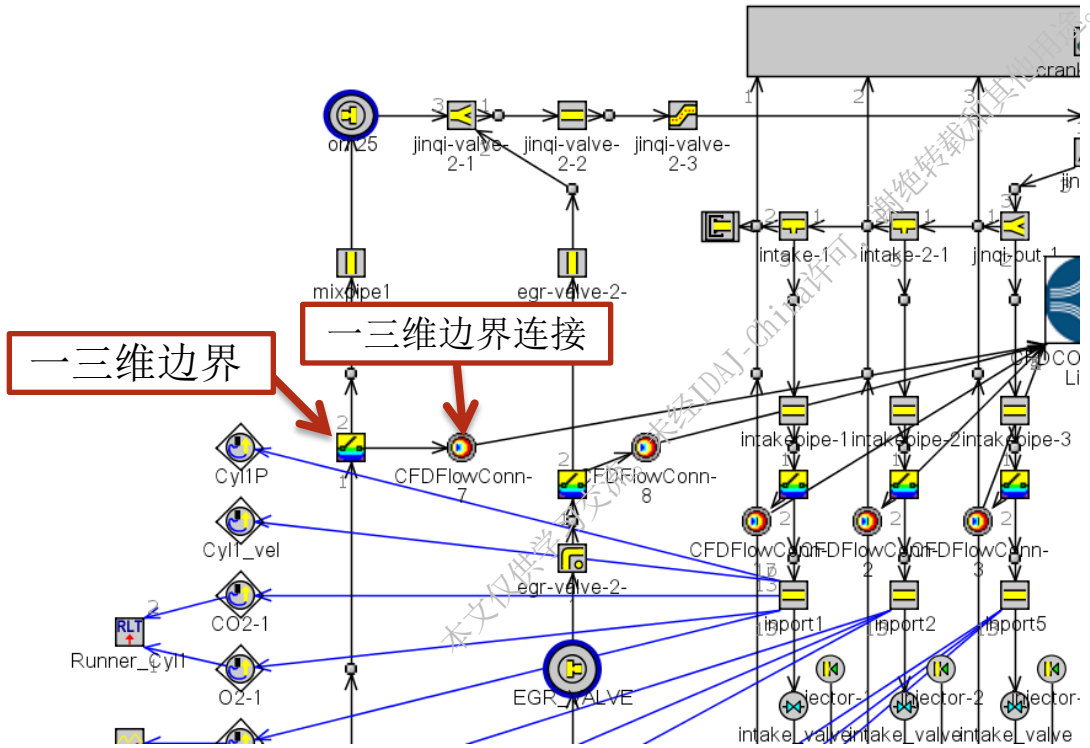
- 根据各个气门升程下的涡流比和流量系数计算平均流量系数和涡流比

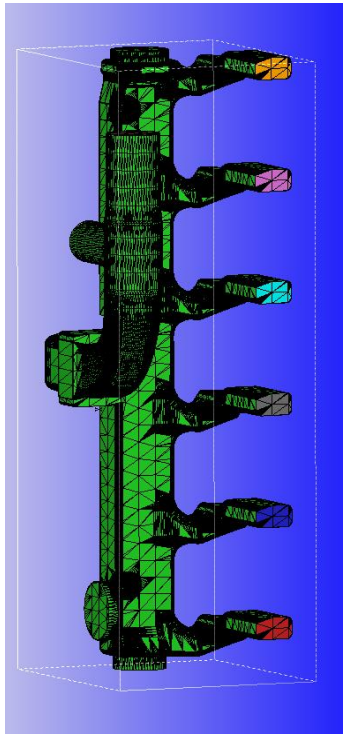
- SCR流动计算



SCR流动分析

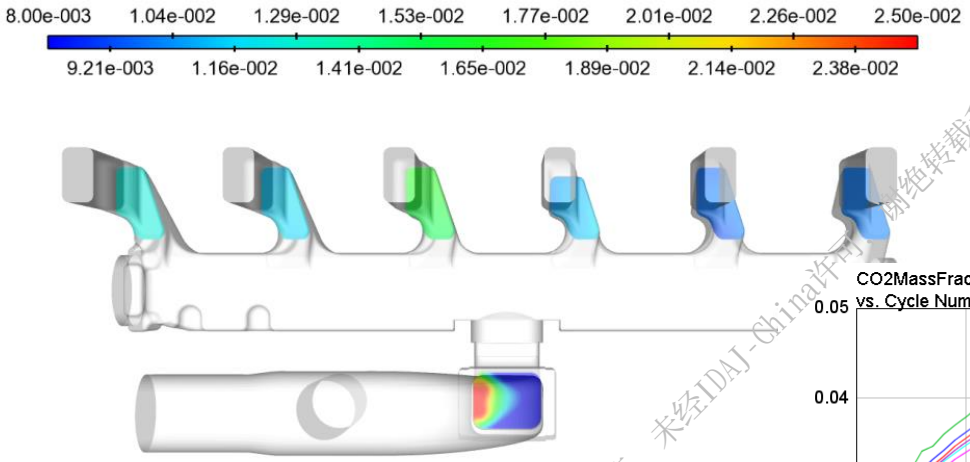
一三维耦合管路流动计算



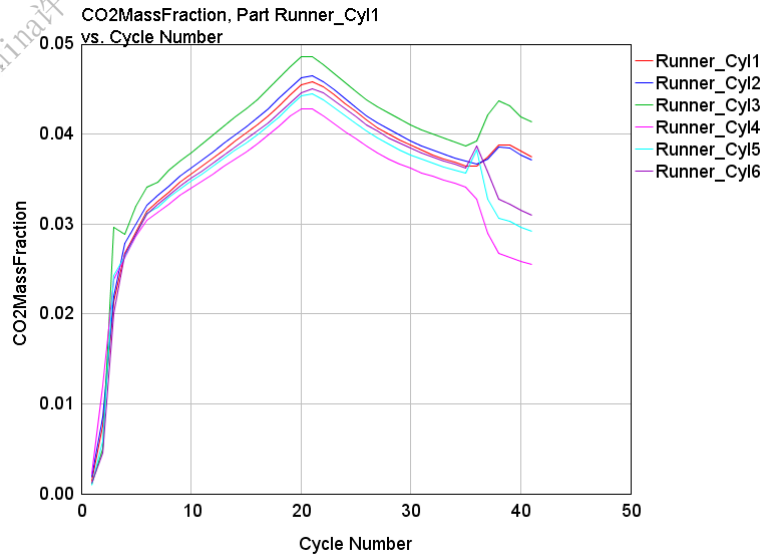


模型搭建

一三维耦合管路流动计算



EGR分布



各缸EGR量对比

4 总结

- 燃烧计算：经过大量的试验验证，CONVERGE的计算准确度能够满足工程开发需求。
- 流动计算：对于复杂的几何结构，便捷的前处理功能节省了大量的工作时间；CONVERGE2.2在流动稳态计算效率方面有了较大改善。

感谢IDAJ公司CONVERGE技术团队对潍柴动力的支持！

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