



# **DIRECT INJECTION OF VARIABLE GASOLINE / METHANOL MIXTURES**

## **- INJECTION AND SPRAY CHARACTERISTICS -**



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### ***Direct Injection SI Engine Technology***

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- **PARTICULARITIES OF MIXTURE FORMATION FOR THE DIRECT INJECTION OF GASOLINE / METHANOL MIXTURES**
- **FEATURES OF THE DIRECT INJECTION SYSTEM**
- **ANALYSIS OF THE SPRAY CHARACTERISTICS**
  - **Apparatus and Technique**
  - **Image Analysis**
- **MEASUREMENT PROCEEDING**
- **RESULTING SPRAY CHARACTERISTICS**
  - PARAMETERS:** {
    - **Fuel type**
    - **Injection volume**
    - **Injector opening pressure**
    - **Needle lift**
    - **Pintle/ seat geometry (spray angle)**
- **CONCLUSIONS**

## PRESENTATION OUTLINE



**ATTRIBUTES OF THE PRESSURE PULSE DIRECT INJECTION SYSTEM**

- INJECTION CHARACTERISTICS ARE INDEPENDENT ON SPEED
- INJECTION DURATION IS INDEPENDENT ON THE INJECTED VOLUME

**SPRAY CHARACTERISTICS BY MEANS OF LASER SHEET ANALYSIS**

- PENETRATION LENGTH
- JET FORM / LIQUID DROPLET DISTRIBUTION
- SPRAY TIP MEAN VELOCITY

**SPRAY BEHAVIOR WHEN USING GASOLINE / METHANOL BLENDS**

- FUEL TYPE - SHORTER INJECTION TIME FOR METHANOL  
- SLIGHTLY REDUCED SPRAY TIP VELOCITY (LIQUID DROPLETS) DESPITE A HIGHER PRESSURE AMPLITUDE FOR METHANOL (FASTER VAPORIZATION)
- INJECTION VOLUME - SPRAY VELOCITY SLIGHTLY INCREASES WITH THE VOLUME / CONSTANT INJECTION DURATION (METHANOL AND GASOLINE)
- INJECTOR OPENING - SPRAY VELOCITY SLIGHTLY INCREASES WITH THE OPENING PRESSURE / CONSTANT INJECTION DURATION (METHANOL AND GASOLINE)
- NEEDLE LIFT - SPRAY CONE ANGLE INCREASES WITH THE LIFT
- SPRAY CONE ANGLE - BETTER VAPORIZATION WITH INCREASED CONE ANGLE

## CONCLUSIONS