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Study of Effective Parameter on Distribution of EGR/Blowby Injection in the EF7 Intake Manifold

P. B. Shahabi, H. Niazmand and M. R. M. Razavi

ABSTRACT

Increase of environmental pollution and stricted emission legislations has forced companies to produce automobiles with the lower air pollutants. In this respect, discharge of blowby gases into the environment is prohibited and recirculating the gases into the combustion chamber and burning them is used as the accepted solution. In addition, using EGR technique to control and reduce nitrogen oxides in internal combustion engines has been quite effective. An important common feature of these two methods is that if they have not employed correctly the increase of other pollutants and significant engine power reducti-on may occur which is mostly due to maldistribution of recirculated gases in the manifold. Besides the injection position that has significant role in distribution of injected gas, it seems that other parameters such as the engine speed, the velocity and angle of injection may play a great role on the distribution of i-njected gases. In this numerical study the effect of these parameters on distribution of injected EGR or blowby gases into the EF7 intake manifold are determined. Results show inject-ion angle and engine speed have the least and the most effect on injected gases distribution, respectively.

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KEYWORDS : Recirculated gases, Blowby gases, Injection angle, Injection velocity, Engine speed, Maldistribution

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$$\frac{\dot{m}_{EGR/Blowby,i}}{\dot{m}_{EGR/Blowby}} = \frac{\dot{m}_{air} + \dot{m}_{EGR/Blowby}}{N \dot{m}_{EGR/Blowby}} \frac{T_i - T_{air}}{T_{EGR/Blowby} - T_{air}} \quad () \quad CO_2$$

$$\dot{m}_{EGR/Blowby,i} \quad HC$$

$$\dot{m}_{EGR/Blowby} \quad \dot{m}_{air} \quad () \quad ()$$

$$N \quad (HC \quad CO_2) \quad ($$

$$T_{EGR/Blowby} \quad T_{air}$$

$$T_i$$

$$C_p$$

Intel E 6400)
 DDR2 GB / GHz (Core 2 Duo

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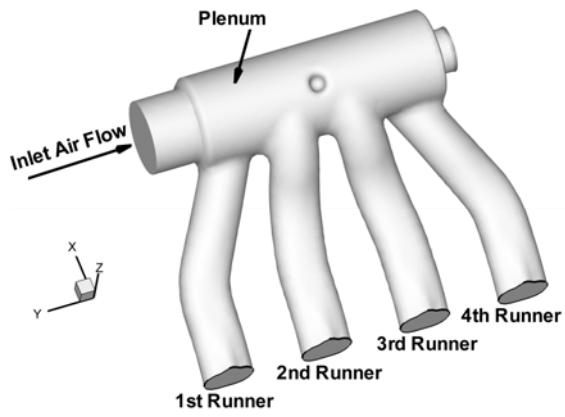
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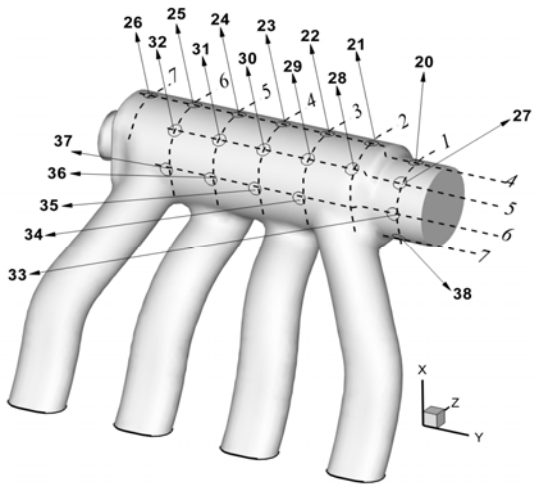
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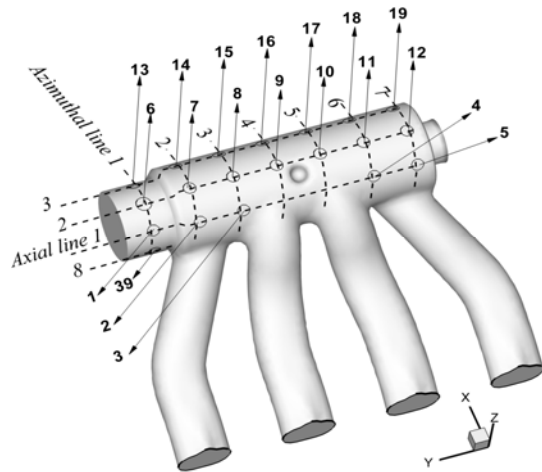
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$$\frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \vec{V}) = 0 \quad ()$$

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$$\rho \left(\frac{\partial \vec{V}}{\partial t} \right) + (\vec{V} \cdot \nabla) \vec{V} = -\nabla p + \nabla \cdot \vec{\tau} \quad ()$$

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$$\rho C_p \left(\frac{\partial T}{\partial t} \right) + (\vec{V} \cdot \nabla) T = -\nabla \cdot (k \nabla T) \quad ()$$

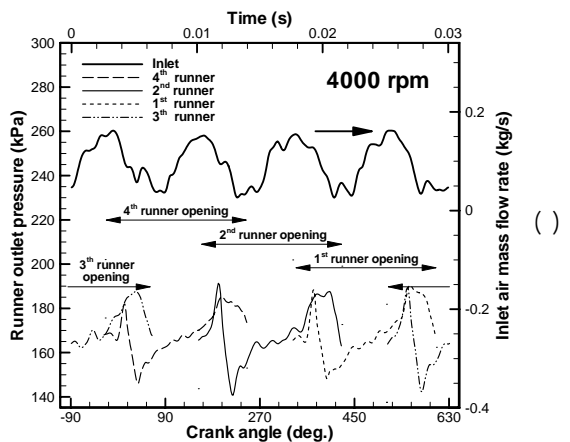
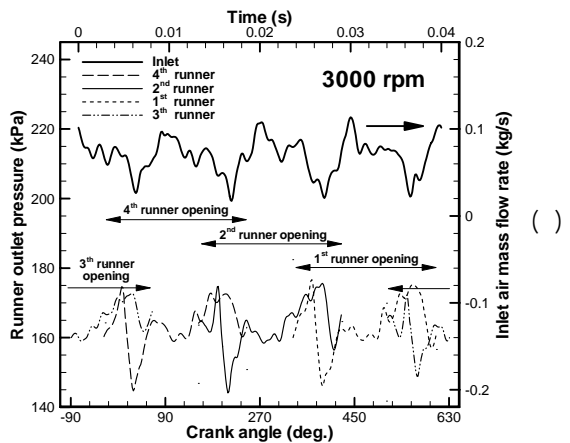
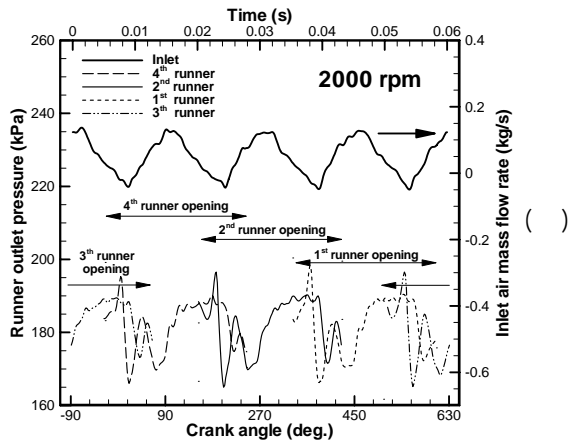
$$p = \rho RT \quad ()$$

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$$\vec{\tau} = \mu \vec{\gamma} = \mu [\nabla \vec{V} + (\nabla \vec{V})^T]$$

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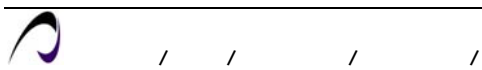
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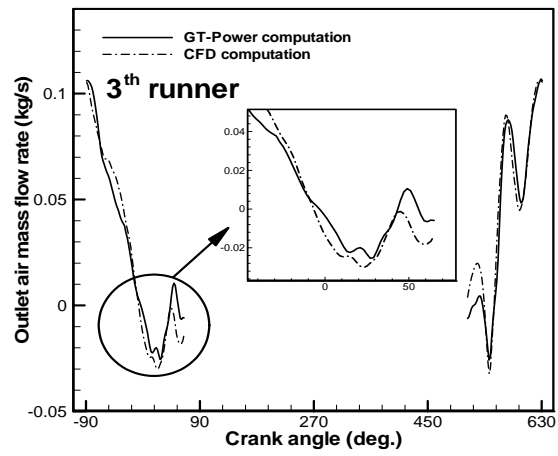
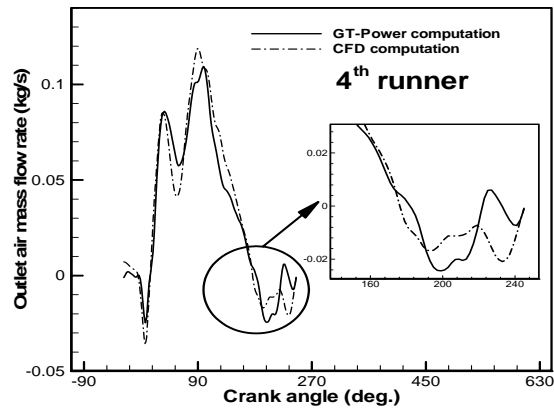
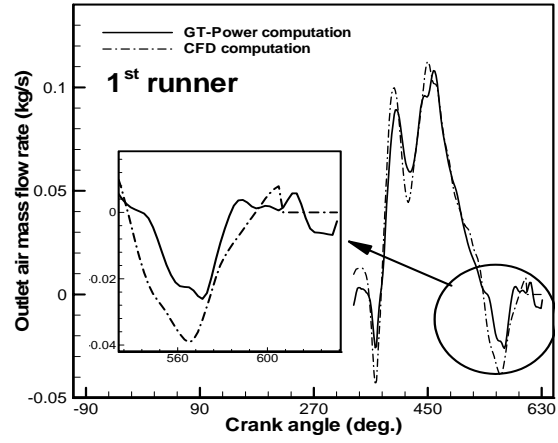
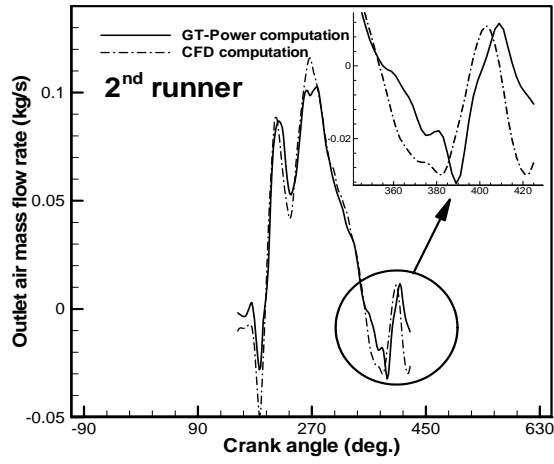
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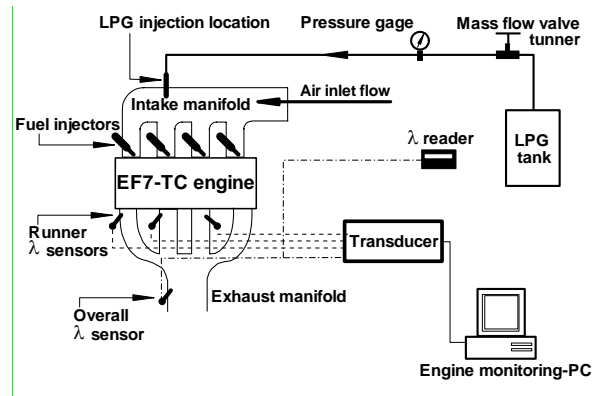
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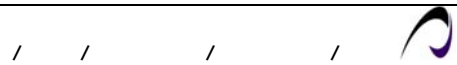
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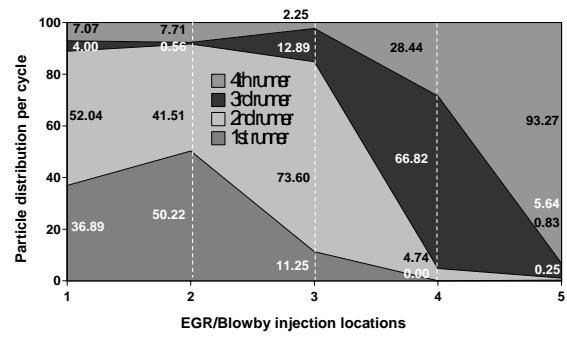
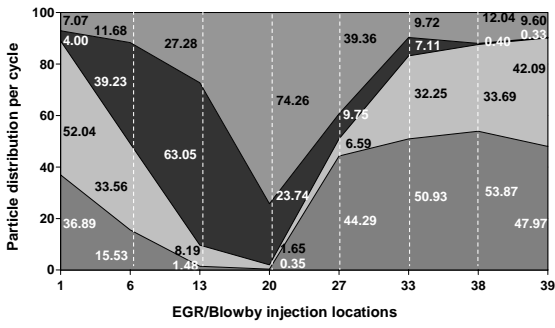
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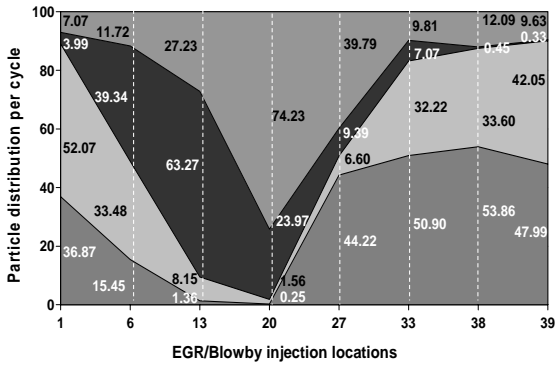
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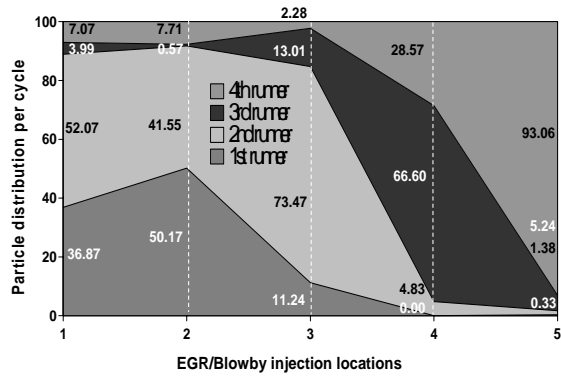
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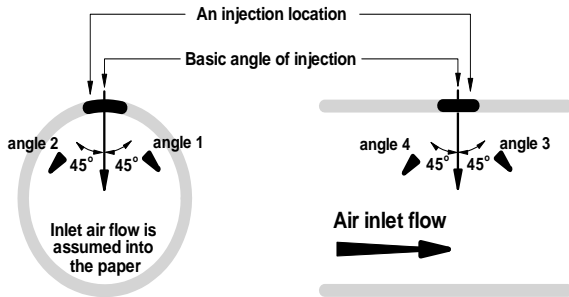


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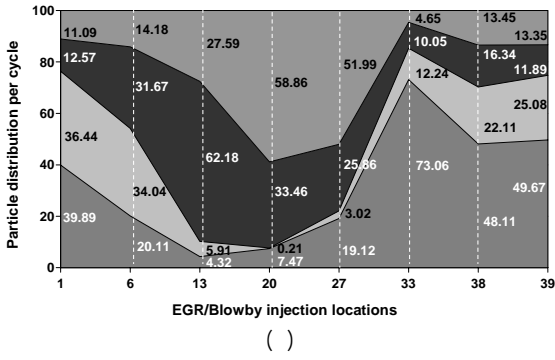
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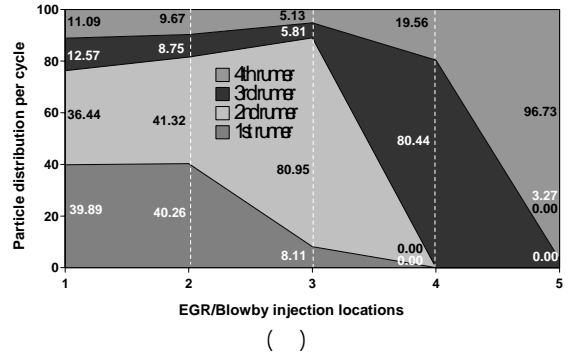
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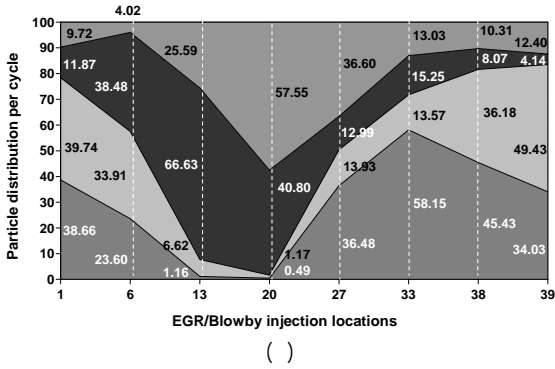
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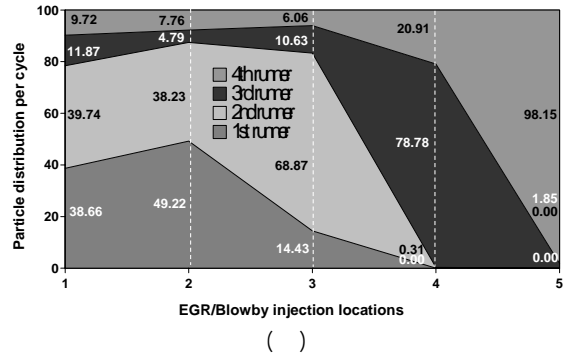
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