EEPS/SMPS Key Feature Comparison:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>EEPS</th>
<th>SMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size range (nm)</td>
<td>5.6 – 150</td>
<td>5.6 – 100</td>
</tr>
<tr>
<td>Size resolution</td>
<td>1.6 – 6.4</td>
<td>1.6 – 6.4</td>
</tr>
<tr>
<td>Time resolution (s)</td>
<td>0.1 – 100</td>
<td>0.1 – 100</td>
</tr>
<tr>
<td>Concentration</td>
<td>200 – 10,000</td>
<td>200 – 10,000</td>
</tr>
</tbody>
</table>

Fig. 1. An example of EEPS/SMPS particles size distribution comparison for the exhaust from a John Deere 4096DI diesel engine under steady state conditions.

Objectives

1. Characterize the EEPS performance using mono- and polydisperse engine exhaust aerosols.
2. Improve size distribution agreement between the EEPS and SMPS when measuring vehicle exhaust aerosols.

Principle of the EEPS

Principle:

- Unipolar diffusion charging by two corona chargers;
- Differential electrical mobility separation under flow and electric fields;
- Electric charge detection by 22 parallel electrometers;
- Data inversion to obtain size distribution.

Fig. 2. Schematic diagram of the EEPS.

Conclusions

- The EEPS with default inversion matrix underestimates the size and concentration of >100 nm engine exhaust aerosols.
- Using experimentally generated soot matrix significantly improved agreement between EEPS and SMPS and CPC for many cases of diesel and gasoline vehicle emissions.
- Further testing with different engines and conditions are needed to verify the versatility or further improve the new soot matrix.

References

- Boy et al., 2004.
- Xenia et al., 2004.

Acknowledgements

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