**Uncertainty Analysis:**

Uncertainty analysis may be used to assess the degree of accuracy of ascertained parameters. Moreover, it depicts the extent of error in each reading of experimental setup. Table 1 displays the measurable range of parameters, accuracy and uncertainty in the measurements. However, the total uncertainty of experimental setup (Uexp) calculated through following equation [32]:

Uexp = [ (USpeed)2 + (UPower)2 + (UBSFC)2 + (UCO)2 + (UCO2)2 + (UNOx)2 + (UHC)2]1/2

Uexp = [ (0.5)2 + (1)2 + (0.5)2 + (1)2 + (1)2 + (1)2 + (1)2]1/2

Uexp = 2.35%

Table 1. Measurable Range, Accuracy and Uncertainty in Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| Parameters | Measurable Range | Accuracy | Uncertainty (%) |
| Speed | 0-7000 rpm | ±2 | ±0.5 |
| Power | 0-110 kW | ±0.5 | ±1 |
| Fuel consumption | - | 0.1 kg/kWh | ±0.5 |
| CO | 0-10000 ppm | ±10 | ±1 |
| CO2 | 0-50 % | ±0.3 %. Vol | ±1 |
| NOx | 0-4000 ppm | ±5 ppm | ±1 |
| HC | 0-4000 ppm | ±5 ppm | ±1 |

**Reference:**

H. Gürbüz, Y. Şöhret, ¨ H. Akçay, Environmental and enviroeconomic assessment of an LPG fueled SI engine at partial load, J. Environ. Manag. 241 (2019), 631–636.