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Liquefied petroleum gas supplementation system for efficient governing of producer gas based electricity generators

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Electricity generation from biomass is an important theme in renewable energy research. The biomass is converted in fuel gas which is used to generate the electricity through gas based electricity generator. Using gasification technology, the producer gas can be generated from biomass. In this process, the biomass is partially oxidised to fuel gas, constituted of carbon monoxide, hydrogen, methane and carbon dioxide. Among fuel constituents of producer gas, carbon monoxide has highest contribution. Producer gas is low calorific gas; 4-5 MJ/Nm^3. Operating only on producer gas, the electricity generator shows abrupt and inconsistent behaviour at the time of sudden loadings as the governing efficacy is not in accordance with Indian Standards (BIS-10000 (part VII)-1980). Sudden loadings demand higher energy quantum instantaneously which is difficult to be met by producer gas generation system. We hypothesized that mixing the high calorie gas with producer gas just at the time of load change may solve the problem. A liquefied petroleum Gas supplementation (LPG) system based supplementation system was developed and integrated with the producer gas based power plant (20 kW). On producer gas alone, the time to govern the speed change at different load variations (25%; on and off) was found as 480-720 s. By introducing the LPG based supplementation system, the time periods to sustain sudden loadings reduced to 5-10 s. The blending of 3 % by volume (34 % by energy content) with LPG was found optimum. Paper elaborates results of using LPG supplementation system with producer gas based electricity generators.

Biography

Sandip Gangil completed his Doctor of Engineering in 2008 from Shizuoka University, Japan. He is the Principal Scientist at Central Institute of Agricultural Engineering, Bhopal, India.

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