

建設機械から排出される温室効果ガスの 亜酸化窒素とメタンの概況把握を 目的とした排出ガスの測定

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建設機械から排出される温室効果ガスの亜酸化窒素 (N_2O)とメタン (CH_4)の概況を把握することを目的として油圧ショベル7台の排出ガスを FTIR (フーリエ変換赤外分光光度計) を使用した PEMS (Portable Emissions Measurement System) で測定した。測定対象の動作は、動力の小さい「待機」、および動力が走行、掘削等と同程度の大きさで測定値の偏差が小さい「ならし(模擬動作)」の2種類とした。国内外の文献にみあたらない以下の知見を得た。(1) SCR (尿素選択的還元装置) 搭載車の「ならし(模擬動作)」で排出される N_2O の温室効果が相対的に大きい。(2) 「ならし(模擬動作)」で排出される N_2O の温室効果ガスとしてのシェア (relative contribution to GHG emissions (CO_2 -equivalent)) は、SCR 非搭載車 3 台の平均で 0.45%、SCR 搭載車 4 台の平均で 2.7%であった。SCR 搭載車の 2.7%は公道を走行する SCR 搭載の自動車 5 台の文献値と同程度の値であった。

MEASUREMENT OF EXHAUST GAS TO CLARIFY THE APPROXIMATE AMOUNT OF THE GREENHOUSE GASES NITROUS OXIDE AND METHANE EMITTED BY EARTH-MOVING MACHINES

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To clarify the approximate amount of the greenhouse gases (GHGs) nitrous oxide (N_2O) and methane (CH_4) emitted by earth-moving machines, a series of measurements were carried out using a portable emissions measurement system (PEMS) that included a Fourier transform infrared (FTIR) analyzer. A total of seven hydraulic excavators were provided for testing: three machines that conform to the 2011 Japanese standards without selective catalytic reduction (SCR) and four machines equipped with SCR that conform to the 2014 standards. The measurements were taken during two types of operation: idling, which is a low-power operation, and grading (simulated work), which is a higher power operation than idling. Grading has similar power requirements to traveling and excavation, and variation in the measured values is small. The results provided the following information which has hitherto not been published in Japan or elsewhere. (1) Earth-moving machines equipped with SCR emit relatively large amounts of N_2O during grading (simulated work). (2) The relative contribution to GHG emissions (CO_2 -equivalent) of N_2O during grading (simulated work) by the three non-SCR-equipped vehicles, and by the four SCR-equipped vehicles account for averages of 0.45% and 2.7% respectively. The average of 2.7% for SCR-equipped vehicles is roughly equal to the average of 2.9% obtained in five measurements described in the literature reporting on SCR-equipped vehicles traveling on public roads.

キーワード: *greenhouse gas, N_2O , CH_4 , earth-moving machinery, SCR, portable emissions measurement system, FTIR*