ABSTRACT

PROPULSION SYSTEM

A propulsion system 2 for an aircraft 1 comprises a gas turbine engine 10 and a fuel tank 50, 53 arranged to store fuel to power the gas turbine engine 10, wherein the stored fuel comprises at least a proportion of a sustainable aviation fuel – SAF – having a density of between 90% and 98% of the density, ρ_K, of kerosene and a calorific value of between 101% and 105% the calorific value CV_K, of kerosene. The gas turbine engine 10 comprises a combustor 16; and a fuel pump 108 arranged to supply a fuel to the combustor 16 at an energy flow rate, C, the pump 108 being arranged to output fuel at a volumetric flow rate, Q, the percentage of fuel passing through the pump which is not provided to the combustor 16 being referred to as a spill percentage. The fuel comprises X% SAF, where X% is in the range from 5% to 100%, and has a density, ρ_F, and a calorific value CV_F. The propulsion system 2 is arranged such that:

the fuel-change spill ratio, R_s, of:

$$R_s = \frac{spill\ percentage\ at\ cruise\ using\ kerosene}{spill\ percentage\ at\ cruise\ using\ the\ fuel\ with\ X\%\ SAF}$$

is equal to:

$$\frac{\mathrm{Q} - \left({}^{\mathrm{C}}/_{(\mathrm{CV}_K \times \rho_K)}\right)}{\mathrm{Q} - \left({}^{\mathrm{C}}/_{(\mathrm{CV}_F \times \rho_F)}\right)}.$$

To be reproduced with Figure 13 when published.