Abstract

In this work the altitude effect on the thermoeconomic diagnosis of a gas turbine cogeneration system has been determined. In order to isolate this effect, the air-fuel ratio was fixed in the combustion chamber. The variation of environmental conditions with altitude was done by means of a hydrostatic model, taking air as an ideal gas and assuming linear temperature variation. For comparison purposes dead state conditions were taken both constant and variable. Air density decreases for increasing altitude, causing a power drop in the system of about 20%. It was found that this is the main reason for the total product cost rate decreasing. The total product cost per exergy unit increase up to 3% for 3000 m above sea level, which means that it is more expensive to produce every power unit as altitude increases.

Keywords
Altitude effect, Thermoeconomic analysis, Exergy analysis, Cogeneration, CGAM problem, Gas turbines.