International Conference on Numerical Combustion
Rome, Italy, October 14-17, 2025
www.icnc2025.com

# Multi-component vaporisation: tabulated distillation curve models for sustainable aviation fuels

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Certified sustainable aviation fuels from AtJ or HEFA processes can currently be blended up to 50 % with conventional kerosenes in order to reduce the total carbon dioxide emissions from aviation. The blending changes the chemical and physical fuel properties, and it affects the vaporisation and combustion characteristics and hence the performance of jet engines. For an improved mathematical description of the vaporisation process, this study applied a new multi-component vaporisation approach to various blends of AtJ or HEFA fuels (10 %, 20 %, 30 %, 40 % and 50 %) with POSF-10325. The approach assumes uniform distributions of droplet temperature and droplet species concentrations and is based on tabulating a-priori computed numerical equilibrium distillation and physical property curves for isobaric conditions. Furthermore, single-droplet vaporisation simulations were employed to compare predictions based on tabulated distillation curves at both atmospheric and elevated pressures with predictions based on discrete components. The results show that tabulated distillation curves allow an accurate and efficient mathematical description of the vaporisation of sustainable aviation fuel blends. Therefore, models based on tabulated distillation curves are promising alternatives for surrogate, quasi-discrete component or continuous thermodynamics models and may be used for future CFD simulations of gas turbines.