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Experimental validations of a new thermoacoustic simulation software CRISTA

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A new simulation software CRISTA has been developed at LIMSI-CNRS. It is based on the Rott's equations approximation. It computes all thermal and acoustic parameters of a given thermoacoustic device whose geometry is previously designed with another program TADESIGN. To realize the simulation, the user needs only to define a drive ratio at some point of the system and the heat exchanger temperatures. Note that for a prime mover the hot heat exchanger temperature is a simulation result. Every converged solution guarantees the physical principles. Moreover, CRISTA allows computing the quality factor of the resonator. The experimental validations have been successfully performed on different devices coupled to the same prime mover: a simple RLC load, an acoustic amplifier, a pulse tube refrigerator and a lumped boost pulse tube refrigerator.