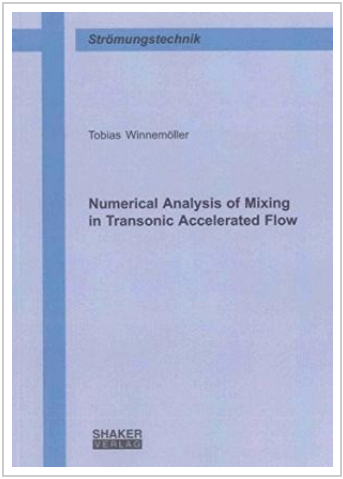

Numerical Analysis of Mixing in Transonic Accelerated Flow

By Tobias Winnemöller

Shaker Verlag Jul 2013, 2013. Buch. Book Condition: Neu. 208x146x12 mm. Neuware - To analyze the gasdynamical generation of nanoparticles, the turbulent mixing of the heavy gas tetraethoxysilane (TEOS - Si(C2H50)4) in a hot accelerated air co-flow is numerically investigated for two injector configurations, one with a plane geometry and one with a streamwise-ramp geometry. The precursor gas TEOS is premixed with nitrogen and ejected through circular holes in the base of an injector into the nozzle flow at a co-flow Mach number of Maco-flow ~ 0.66 and a temperature of Tco-flow ~ 1200K. Immediately downstream of the blunt trailing edge of the injector the flow field is accelerated to supersonic speed. The mixing is dominated by pronounced free shear layers generating trailing vortices, which transport the partially mixed precursor gas but do not enhance further mixing. After a certain mixing length a shock train decelerates the flow to subsonic speed and rapidly increases the temperature, which, after the elapse of an ignition lag, starts the reaction of the precursor with oxygen that generates the nanoparticles. The mixing process is determined by a multi-species large-eddy simulation (LES) that covers the mixing process in the injector wake and across the shock...

Reviews

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