Abstract Submitted
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Experimental study on resonance heat generation due to shock wave compression[1] SEONGHYEON SEO, Hanbat National University — The presentation addresses an experimental study of heat generation phenomenon associated with the conversion of flow kinematic energy to thermal energy through acoustic resonance. The phenomenon has been examined using a set of a sonic nozzle and a resonance tube. An underexpanded jet from the nozzle enters the tube and its shock waves compress the gas in the tube and reflect from the end. The repetition of the compression in a resonant manner results in an abrupt increase of gas temperature inside. The results indicate that various geometrical and flow parameters including a nozzle diameter, a tube inlet diameter, a distance between the nozzle and the tube, a nozzle stagnation pressure, a mass flow rate and a working fluid, affect heat generation characteristics. High-speed Schlieren imaging of supersonic flow in the vicinity of the nozzle exit and the tube inlet successfully identifies and reveals that corner space adjacent to the inlet edge of the tube should be large enough to allow the reflecting flow to expand and escape the tube for the occurrence of the resonance. The application of helium as working gas compared with nitrogen shows that the temperature increase becomes two times greater and it reaches beyond 1000 K in less than two seconds.

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