

High-Speed Air-Breathing Propulsion

Papers Presented at the AIAA Propulsion and Energy
Forum 2019

Indianapolis, Indiana, USA
19 - 22 August 2019

ISBN: 978-1-7138-0114-6

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 34922 Uwytkug'Xcmg{'Ftkxg.'Uwky'422, Reston, VA 20191, USA.

TABLE OF CONTENTS

PERFORMANCE OF A GENERIC X-51 WAVERIDER – THRUST, DRAG, AND TRIM COMPUTED USING THE MASIV REDUCED ORDER MODEL	1
<i>M.F. Yost, Y. Choi, E.W. Lerner, J.F. Driscoll</i>	
DEVELOPMENT OF A 1D DUAL MODE SCRAMJET MODEL FOR A HYPERSONIC CIVIL AIRCRAFT	17
<i>A.C. Ispir, B.H. Saracoglu</i>	
NUMERICAL INVESTIGATION OF THE STRATOFLY MR3 PROPULSIVE NOZZLE DURING SUPERSONIC TO HYPERSONIC TRANSITION	26
<i>L. Nista, B.H. Saracoglu</i>	
AN ENGINEERING MODEL TO PREDICT FLOW FEATURES OF A SONIC OR SUPERSONIC GASEOUS JET INTO SUPERSONIC CROSSFLOW	42
<i>G. Huggins, D. Fries, S. Menon</i>	
COLD START-UP AND PLASMA-BASED FLAMEHOLDING IN MODEL SCRAMJET	59
<i>A. Houpt, S. Elliott, S. Lenov</i>	
INSTABILITIES OF SUPERSONIC COMBUSTION AT PLASMA-BASED FLAMEHOLDING	72
<i>S. Elliott, A. Houpt, S.B. Lenov</i>	
LASER-INDUCED PLASMA IGNITION EXPERIMENTS IN A DIRECT-CONNECT SUPERSONIC COMBUSTOR AT MACH 3	83
<i>D. Baccarella, G.S. Lee, Q. Liu, G.S. Elliott, J.B. Freund, T. Lee</i>	
MODAL DECOMPOSITION ANALYSIS OF THE FUEL-AIR MIXING IN THE SUPERSONIC COMBUSTOR WITH A CAVITY	99
<i>S.M. Jeong, P.K. Pavalavanni, J.Y. Choi</i>	
RESEARCH ON TRANSIENT CHARACTERISTICS OF SCRAMJET ENGINE USING DYNAMIC SIMULATOR	106
<i>K. Kubosaki, S. Tomioka, T. Kimura</i>	
FLOW PATH AND INTERACTION ANALYSIS IN A HYDROGEN TRANSPIRATION COOLED SCRAMJET MODEL COMBUSTOR	117
<i>F.T. Strauss, S. General, C. Manfretti, S. Schleichtriem</i>	
USING COMPUTATIONAL FLOW IMAGING TO OPTIMIZE FILTERED RAYLEIGH SCATTERING MEASUREMENTS OF AN ISOLATOR SHOCK TRAIN	143
<i>R.L. Hunt, C.R. Ground, R.A. Baurle, P.M. Danehy</i>	
STUDY ON STEADY STATE CONTROL SCHEDULE AND CHARACTERISTIC CALCULATION OF HYDROGEN-FUELED SCRAMJET	159
<i>D. Sato, S. Tsutsumi, M. Hirabayashi, K. Kawatsu, T. Kimura</i>	
ESTIMATION OF MODEL PARAMETERS IN SYSTEM-LEVEL SIMULATION FOR LIQUID ROCKET ENGINES USING THE ENSEMBLE KALMAN FILTER	172
<i>T.G. Drozda, R.R. Shenoyk, E.L. Axdahl, R.A. Baurle</i>	
REACTING DYNAMIC HYBRID REYNOLDS-AVERAGED NAVIER-STOKES/LARGE-EDDY SIMULATIONS OF A MACH 3 CAVITY	189
<i>E. Hassan, D.M. Peterson, D.K. Walters</i>	
EFFECT OF MACH NUMBER ON THE FLOW CHARACTERISTICS OF FREE AND CONFINED PULSED JETS	210
<i>C. Leos, G. Acosta, O. Rodriguez, R. Freeman, I. Choutapalli</i>	
CFD EVALUATION OF LEAN-DIRECT INJECTION COMBUSTORS FOR COMMERCIAL SUPERSONICS TECHNOLOGY	225
<i>K. Ajmani, C.T. Chang, P. Lee, M.T. Kudlac</i>	
A THEORY FOR MOMENTUM, ENERGY, AND MASS TRANSPORT IN SUPERSONIC SPRAY COMBUSTION	233
<i>F. Ladeinde</i>	
PREMIXED ETHYLENE-AIR COMBUSTION IN A DUAL-MODE SCRAMJET CAVITY COMBUSTOR WITH A TURBULENT INFLOW	266
<i>G.B. Goodwin, R.F. Johnson, D.A. Kessler, H.K. Chelliah</i>	
EXPERIMENTAL DATA FROM RAMJET/SCRAMJET COMBUSTION AND NUMERICAL VALIDATION PERSPECTIVES	276
<i>G.Riva, G. Daminelli, C. Paravan, F. Maggi, G. Colombo, A. Verga, R. Bisin, S. Carlotti, S. Dossi, L. Galfetti, V. Gaioni</i>	

FLAME SUSTAINABILITY AND THERMAL CHOKING STUDY OF SUPERSONIC COMBUSTION OF HYDROGEN, METHANE, AND ETHYLENE	290
<i>W. Li, F. Ladeinde</i>	
A COMPARATIVE STUDY OF SUBGRID MODELS, REACTION MECHANISMS AND COMBUSTION MODELS IN LES OF SUPERSONIC COMBUSTION	314
<i>C. Fureby</i>	
EFFECTS OF MOMENTUM FLUX RATIO ON COMBUSTION IN THE HYSHOT SCRAMJET ENGINE	332
<i>F. Ladeinde</i>	
DESIGN OF A SOLID FUEL RAMJET GROUND LAUNCH DEMONSTRATOR	343
<i>S.W. Kubicki, A. Martinez, J. Rohwer</i>	
DEVELOPMENT AND OPTIMIZATION OF A HYPERSONIC CIVIL AIRCRAFT PROPULSION PLANT WITH REGENERATOR SYSTEM	367
<i>P. Goncalves, A.C. Ispir, B.H. Saracoglu</i>	
Author Index	