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A Pressure-distribution Investigation of a Supersonic-aircraft Fuselage and Calibration of the Mach Number 1.40 Nozzle of the Langley 4- by 4-foot Supersonic Tunnel A Supersonic Area Rule and an Application to the Design of a Wing-body Combination with High Lift-drag Ratios Aerodynamic Tip Theory of a Supersonic Propeller *Dynamic Response of a Supersonic Diffuser to Bypass and Spike Oscillation* **The Performance of a Supersonic Airplane** The Flutter of a Buckled Plate in a Supersonic Flow *Normal Impingement of a Supersonic Jet on a Plane Supersonic Flow and Shock Waves Supersonic* Base pressure at supersonic speeds in the presence of a supersonic jet **A Study of Penetration of a Liquid Injectant Into a Supersonic Flow Wind-tunnel Measurements of the Sonic-boom Characteristics of a Supersonic Bomber Model and a Correlation with Flight-test Ground Measurements** *The Design of a Variable Throat Rectangular Nozzle for a Supersonic Wind Tunnel Preliminary Attempts at Isothermal Compression of a Supersonic Air Stream* **An Investigation of a Supersonic Aircraft Configuration Having a Tapered Wing with Circular-arc Sections and a 40© Sweepback** *Aerodynamic Characteristics of a Supersonic Fighter Aircraft Model at Mach 0.40 to 2.47* **Air-film Cooling of a Supersonic Nozzle** On the Entrained Mass of a Supersonic Jet in Off-design System *Transonic Aerodynamic Characteristics of a Supersonic Cruise Aircraft Research Model with the Engines Suspended Above the Wing* **An Experimental Study of a Supersonic Profile** The Wave Drag of a Supersonic Biplane of Finite Span *Wind-tunnel Free-flight Investigation of a Supersonic Persistence Fighter* **Subsonic and Supersonic Aerodynamic Characteristics of a Supersonic Cruise Fighter Model with a Twisted and Cambered Wing with 74 ?sweep** *Supersonic (Airliner) Non-Sense* The Design of a Supersonic Wind Tunnel *Stability and Control of a Supersonic Transport Airplane During Landing Approach* **Dynamics of a Supersonic Inlet with Adjustable Bypass in Combination with a J34 Turbojet Engine** Analysis of the Dynamic Response of a Supersonic Inlet to Flow-field Perturbations Upstream of the Normal Shock A Two-Dimensional Numerical Simulation of a Supersonic, Chemically Reacting Mixing Layer Interaction of a Side Jet with a Supersonic Main Stream **Design of a Supersonic Wind Tunnel** *Take-off Distances of a Supersonic Transport Configuration as Affected by Airplane Rotation During the Take-off Run A Numerical Investigation of a Supersonic Flow Over an Open Cavity* Commercial Supersonic Technology **The Design of a Supersonic Wind Tunnel** Numerical Study of Control of Dynamic Properties of a Supersonic Inlet Using Bypass Bleed **Essentials of Supersonic Commercial Aircraft Conceptual Design A Pressure-distribution Investigation of a Supersonic Aircraft Fuselage and Calibration of the Mach Number 1.59 Nozzle of the Langley 4- by 4-foot Supersonic Tunnel** *Design of a Supersonic Wind Tunnel* Analysis of a Bypass Air Control

System for a Supersonic Mixed-compression Inlet

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Provides comprehensive coverage of how supersonic commercial aircraft are designed This must-have guide to conceptual supersonic aircraft design provides a state-of-the art overview of the subject, along with expert analysis and discussion. It examines the challenges of high-speed flight, covers aerodynamic phenomena in supersonic flow and aerodynamic drag in cruising flight, and discusses the advantages and disadvantages of oblique wing aircraft. Essentials of Supersonic Commercial Aircraft Conceptual Design is intended for members of a team producing an initial design concept of an airliner with the capability of making supersonic cruising flights. It begins with a synopsis of the history of supersonic transport aircraft development and continues with a chapter on the challenges of high-speed flight, which discusses everything from top level requirements and cruise speed requirements to fuel efficiency and cruise altitude. It then covers weight sensitivity; aerodynamic phenomena in supersonic flow; thin wings in two-dimensional flow; flat wings in inviscid supersonic flow; aerodynamic drag in cruising flight, and aerodynamic efficiency of SCV configurations. The book finishes with a chapter that examines oblique wing aircraft. Provides supersonic aircraft designers with everything they need to know about developing current and future high speed commercial jet planes Examines the many challenges of high-speed flight Covers aerodynamic phenomena in supersonic flow and aerodynamic drag in cruising flight Discusses the advantages and disadvantages of oblique wing aircraft Essentials of Supersonic Commercial Aircraft Conceptual Design is an ideal book for researchers and practitioners in the aerospace industry, as well as for graduate students in aerospace engineering. Oasis are one of the biggest bands the world has ever seen. Here, in Supersonic, they tell the story of the their beginnings from dive-bar hopefuls to global superstars. They themselves talk us through the pivotal moments in their phenomenal trajectory, from the day Noel Gallagher joined his brother Liam's band, through their first crucial five years culminating at their landmark gigs at Knebworth Park in 1996 - the pinnacle of their success. With over thirty hours of interviews with Liam, Noel and those closest to them, this book documents in unprecedented depth and with their trademark candour and humour, the story behind one of the world's greatest bands, all told in their own words and fully illustrated with exclusive photographs and ephemera throughout. The results are presented of experimental determination of the entrained mass of a supersonic jet in off-design systems of discharge. There is given an empirical formula which connects the entrained mass of the original area of the supersonic jet in off-design modes of out-flow with the number M sub a at the cut of the nozzle, with the off-design degree, and with the distance from the nozzle cut to the section under consideration. (Author). An experimental investigation was conducted in the University of Michigan Supersonic Wind Tunnel to explore the main characteristics of the flow and pressure field generated by a supersonic jet directed at 90 deg to the body into the 1.90-Mach-number tunnel stream. In particular, a study was made of the spreading characteristics of the jet and its gross effect on the normal force, drag, and moment of the cone-cylinder body, from which the jet issued. The phenomenon was investigated as a function of pressure ratio, (jet stagnation pressure to tunnel static pressure), angle of attack of the body, and jet-nozzle

geometry. Within a relatively short distance from the exit, the normal jet was turned in the direction parallel to the free stream even at pressure ratios of over 50. Simultaneously, it spread in all directions, mixing violently with the free stream. Optical evidence suggests that fringes of the jet are in contact with the cylinder. This may have practical implications for the use of hot side-control jets on bodies. The interaction resulted in regions of both high and low pressure over the body. The normal force on the body was decreased below the nominal jet side-thrust value, and the drag was increased above the no-jet value. A moment which depends on the geometry, particularly the length of the body, was generated about the nominal center of gravity of the body. Summary: As an extension of the transonic area rule, a concept for interrelating the wave drags of wing-body combinations at moderate supersonic speeds with axial developments of cross-sectional area has been derived. The wave drag of a combination at a given supersonic speed is related to a number of developments of cross-sectional areas as intersected by Mach planes. On the basis of this concept and other design procedures, a structurally feasible, swept-wing--indented-body combination has been designed to have relatively high maximum lift-drag ratios over a range of transonic and moderate supersonic Mach numbers. The wing of the combination has been designed to have reduced drag associated with lift and, when used with an indented body, to have low zero-lift wave drag. Experimental results have been obtained for this configuration at Mach numbers from 0.80 to 2.01. Maximum lift-drag ratios of approximately 14 and 9 were measured at Mach numbers of 1.15 and 1.41, respectively. Research has been undertaken to achieve an improved understanding of physical phenomena present when a supersonic flow undergoes chemical reaction. A detailed understanding of supersonic reacting flows is necessary to successfully develop advanced propulsion systems now planned for use late in this century and beyond. In order to explore such flows, a study was begun to create appropriate physical models for describing supersonic combustion, and to develop accurate and efficient numerical techniques for solving the governing equations that result from these models. From this work, two computer programs were written to study reacting flows. Both programs were constructed to consider the multicomponent diffusion and convection of important chemical species, the finite rate reaction of these species, and the resulting interaction of the fluid mechanics and the chemistry. The first program employed a finite difference scheme for integrating the governing equations, whereas the second used a hybrid Chebyshev pseudospectral technique for improved accuracy. Drummond, J. Philip Langley Research Center BOUNDARY LAYERS; CHEMICAL REACTIONS; FLUID MECHANICS; MIXING; MIXING LAYERS (FLUIDS); NUMERICAL ANALYSIS; SIMULATION; SUPERSONIC FLOW; CHEBYSHEV APPROXIMATION; COMPUTER PROGRAMS; FINITE DIFFERENCE THEORY; HYPERSONIC AIRCRAFT; SUPERSONIC COMBUSTION RAMJET ENGINES... Since the dramatic flight by "Chuck" Yeager in 1947, when an aircraft first exceeded the speed of sound, the dream of a successful supersonic airliner has captivated the interest of many manufacturers & of many governments. But as yet, only a few concordes & a couple of Tupolev Tu-144s have gone into service, on a very few routes & none were ever sold. The cost of developing any supersonic airliner is prohibitive. The prospect of their being able to operate economically is remote. The market for such an aircraft (which would have to charge premium fares, even

more than first class) is very small. Manufacturers & government agencies alike continue to base their multi-million research programs on inflated market "estimates" that combine substantial elements of special pleading & wishful thinking. Statements invariably include a plethora of "shoulds" & "coulds" in their predictions; but their assumptions carry little weight, as they are ill-supported by known data. The conclusions drawn to produce market "estimates" of more than a thousand aircraft neither clear-headed nor objective. This book, written by an experienced analyst who spent most of his career in commercial airline market research & traffic forecasting, explodes the myth. The analysis draws upon known facts, applies simple arithmetic & makes assumptions that are based on technical, operational & commercial sense. Guided by analytical predictions, preliminary experiments were undertaken in an attempt to achieve isothermal (constant static temperature) compression of a supersonic air stream. Application of the process to a supersonic inlet diffuser at free-stream Mach numbers of 1.9 and 3.0 did not produce the theoretically predicted total-pressure rise. Large total-pressure losses due to momentum exchange between the inlet air stream and the coolant occurred, as expected, but the compensating rise in pressure theoretically associated with the available evaporation cooling was not observed. Tests at a Mach number of 3.0 with a heated air stream and multipoint upstream injection suggest that some gain in diffuser pressure recovery might be obtained with a full-scale inlet at the high stagnation temperature of supersonic flight. An analytical study has been made to determine the effects of rotation speed, rotation angle, and rotation time on the take-off distance of a supersonic transport configuration. The takeoff distances were also determined at various rotation speeds to show the effects of such configuration changes as wing loading, maximum lift coefficient, thrust-weight ratio, and induced drag. (Author). High-speed flight is a major technological challenge for both commercial and business aviation. As a first step in revitalizing efforts by the National Aeronautics and Space Administration (NASA) to achieve the technology objective of high-speed air travel, NASA requested the National Research Council (NRC) to conduct a study that would identify approaches for achieving breakthroughs in research and technology for commercial supersonic aircraft. Commercial Supersonic Technology documents the results of that effort. This report describes technical areas where ongoing work should be continued and new focused research initiated to enable operational deployment of an environmentally acceptable, economically viable commercial aircraft capable of sustained supersonic flight, including flight over land, at speeds up to approximately Mach 2 in the next 25 years or less. Courant and Friedrich's classical treatise was first published in 1948 and tThe basic research for it took place during World War II. However, many aspects make the book just as interesting as a text and a reference today. It treats the dynamics of compressible fluids in mathematical form, and attempts to present a systematic theory of nonlinear wave propagation, particularly in relation to gas dynamics. Written in the form of an advanced textbook, it should appeal to engineers, physicists and mathematicians alike. The problem of a balanced, planar or axisymmetric, supersonic jet impinging normally on a flat surface has been considered based on an inviscid theory. The object of the study was to provide a rational model for calculating shock-interference heating as produced by a type IV shock-interaction pattern. The unwanted singularity at a low supersonic Mach number peculiar to scheme I of the one-strip formulation of the method of integral relations, as observed by South and by Gummer and Hunt, was

successfully removed by the application of the scheme III of the one-strip formulation of the method of integral relations. The resulting simultaneous nonlinear algebraic equations were easily solved iteratively by the Newton-Raphson method. Sensitivity of the solution on various approximating functions employed was extensively investigated. Unlike the findings reported by Gummer and Hunt, solutions that satisfy all well-posed boundary conditions can be obtained by the one-strip formulation. Results indicate that, for the planar case, a rational engineering solution for the stagnation-point velocity gradient (and hence the peak heat-transfer rate) has been obtained. For the axisymmetric case, however, solutions appear to be not quite converging. A two-strip formulation based on the method of integral relations is also included. An experimental study was made of the internal air-film cooling of a Mach 2.4, nonadiabatic wall, axially symmetric nozzle. The main stream air was heated to supply temperatures from 672 to 1212 R at supply pressures from 115 to 465 psia. The film coolant air was injected through a single peripheral slot at an angle of 10 degrees from the nozzle wall. The coolant-to-main stream mass flow ratios were varied up to 20%. Steady-state nozzle wall temperatures were measured in both the subsonic and the supersonic flow regimes. The turbulent pipe flow equation of Dittus and Boelter was found to be applicable in predicting the heat transfer rates in the absence of film cooling. A modified version of the semi-empirical equation of Hatch and Papell was found applicable in estimating the filmcooled nozzle wall temperatures. (Author). The paper reports a study of normal and lateral spray penetration for small diameter, high pressure, liquid jets issuing at an angle to a uniform supersonic stream. The experimental program described was carried out in a 4-in. by 4-in. blow down supersonic wind tunnel. The flow field is observed by means of a schlieren system, and the spray distribution is indicated by the light scattered by the liquid droplets. The data on normal penetration, in good agreement with data inferred from other investigations, indicate that a single-parameter correlation exists between the properly nondimensionalized penetration height and the injection pressure ratio. Injecting the coolant at a forward angle to the flow produces no substantial change in the penetration height. The data on lateral penetration show the spray width behind the jet to be proportional to the jet diameter with only a weak dependence on the injection pressure ratio. Analytical models proposed by previous investigators are critically examined in light of the results. No single model leads to a proper scaling law for both normal and lateral penetration. (Author).