

## Supersonic Business Jets in Preliminary Aircraft Design



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***(Quinton Balistreri)***

## SUPERSONIC BUSINESS JETS IN PRELIMINARY AIRCRAFT DESIGN



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Cuvillier Verlag Jul 2016, 2016. Taschenbuch. Book Condition: Neu. 211x149x17 mm. Neuware - The Preliminary Aircraft Design and Optimisation tool, PrADO, is an in-house program of the Institute of Aircraft Design and Lightweight Structures, TU Braunschweig, Germany, which covers a wide range of aspects of aircraft preliminary design. An initial aircraft concept serves as a basis for various analysis modules. Each module is designated to fulfil one special task e.g. aerodynamic analysis, estimation of structural mass, etc. The available methods grouped within those modules range from statistical methods to physics based models. From an aircraft developer's point of view PrADO is used within both, the conceptual and the preliminary design phase. The aim of this thesis is to introduce methods and methodologies to aircraft conceptual and preliminary design, more precisely to PrADO, that allow to judge supersonic aircraft concepts. Therefore, the aerodynamic analysis module, the structural analysis module and the propulsion module are extended. An inviscid flow solver is integrated to obtain aerodynamic coefficients. The calculated data serves as input to other analysis modules of PrADO. While the aerodynamic analysis module solely uses the outer geometry of the aircraft, the structural analysis module uses its internal structural layout as additional input to a herein developed finite element model generator. The distribution of secondary mass, fuel loading and payload distributions as well as loads for ground cases and trimmed flight cases are taken from the PrADO database, whereas the aerodynamic forces are calculated by solving the inviscid Euler equations. The model serves as basis for structural sizing and consequently the estimation of structural mass. The purpose of the propulsion module is to size the engine, to calculate the engine performance map and to provide reliable mass data based on the thermodynamic cycle. PrADO provides various models for the analysis of turbojet,...



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