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IMPLEMENTATION OF WATER IMPACT LOAD REDUCTION FACTORS BASED UPON AERATED WATER IMPACT EXPERIMENTS

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The assessment of water impact loads is essential to predict the behaviour of an aircraft during a ditching event, as well as the structural loads on the aircraft. The computational method *ditch* [1] has been developed to simulate the aircraft motion and loads during emergency landing on water. *ditch* is based upon the momentum method by von Kármán (1929) and Wagner (1932), and has been improved continuously over the past fifteen years.
Former guided ditching model experiments revealed the occurrence of ventilation effects during the impact phase. It was assumed that the presence of air bubbles in the impact zone of the aircraft influences the loads during the impact and shortly afterwards. Therefore, guided vertical impact model tests into aerated water were conducted to analyse the loads on circular cylindrical cross-sections and load changes due to aeration [2]. The results of these experiments revealed a significant impact load reduction due to the aerated water. The results were validated against literature and a new, cross-section-wise load-change coefficient was proposed, affecting the peak load level at the impact zone of the ditching aircraft.
The present paper discusses the interrelation of load changes due to aerated water and the respective aircraft dynamics. In addition to the variation of the impact loads, the influence of these changes on the global motion of the aircraft has to be considered.
The implementation of the new load factors derived from the experimental findings into the method *ditch* is described. Limits of the application of the modified load calculation, e.g. regarding the pitch angle or certain regions of the aircraft are identified.
Simulation results using the modified load model with respect to aircraft dynamics, integral loads and section forces are presented and discussed.

REFERENCES

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