A method of aircraft automatic landing safety compliance verification at the stage of mathematical simulation

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Objective:
The ultralow risk parameters estimation procedures building for the aircraft safety management.

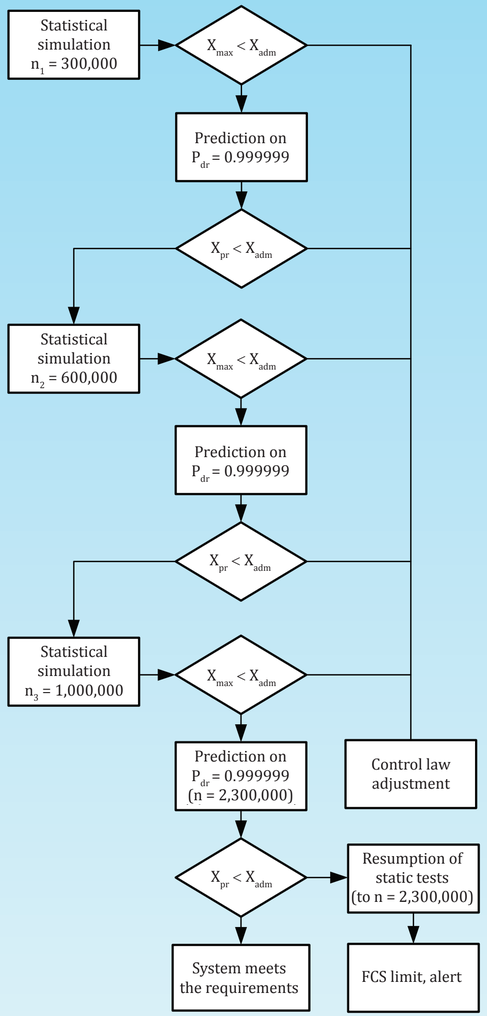
Research direction:
The probabilities distribution empirical functions analysis of the automatic landing safety main performance, achieved at the stage of statistical simulation.

Main results:
1. The selection of analytical dependence probabilities distribution empirical functions approximation methods using
- Pareto distribution;
- mixture distribution;
- spline functions.

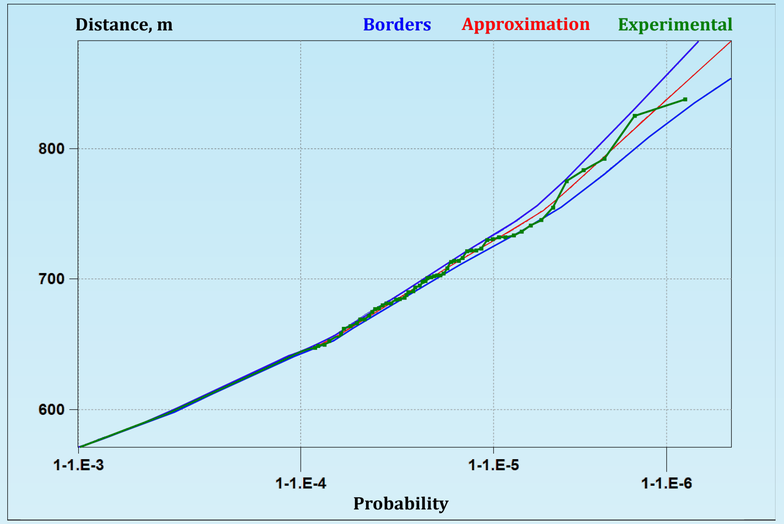
2. The analytical dependence extrapolation to the unobservable distributions “tails”.

Application:
The rough analysis procedure development for the statistical simulations volume contraction and the reasonable engineering decision making.

Validation:
Automatic Landing System for certified An-148 aircraft.



The results of the touchdown distance extrapolation to the unobservable probability distributions “tails”



The touchdown distance prediction results

Number of realizations	Approximation method	Prediction result (m)	
300,000	Pareto	839.673	The experimental value per 1 million of realizations - 814,9 m
	Mixture	857.746	
	Splines	826.03	
600,000	Pareto	830.435	
	Mixture	848.35	
	Splines	825.08	
1,000,000	Pareto	815.865	
	Mixture	829.842	
	Splines	818.67	

Bibliography: L.N. Aleksandrovskaya, V.G. Borisov, V.N. Mazur, S.V. Hlgatyan, A.E. Ardalionova
Non-Parametric Methods for Assessing Compliance with the Safety Requirements of Automatic Landing Aircraft Airworthiness // Mechatronics, automation, control №3(156), March 2014.