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Mixed-integer nonlinear programming for aircraft conflict avoidance by sequentially applying velocity and heading angle changes. (English) [Zbl 1402.90094](#)
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Summary: We consider the problem of aircraft conflict avoidance in air traffic management systems. Given an initial configuration of a number of aircraft sharing the same airspace, the main goal of conflict avoidance is to guarantee that a minimum safety distance between each pair of aircraft is always respected during their flights. We consider aircraft separation achieved by heading angle deviations, and propose a mixed 0-1 nonlinear optimization model, that is then combined with another one which is based on aircraft speed regulation. A two-step solution approach is proposed, where the two models are sequentially solved using a state-of-the-art mixed-integer nonlinear programming solver. Numerical results validate the proposed approach and clearly show the benefit of combining the two considered separation maneuvers.

MSC:

[90C11](#) Mixed integer programming
[90C30](#) Nonlinear programming
[90C90](#) Applications of mathematical programming
[90C26](#) Nonconvex programming, global optimization

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Keywords:

air traffic management; conflict avoidance; mixed-integer nonlinear programming; deterministic global optimization; modeling

Software:

MINLP; ROSE ; MINLPLib; Ipopt; LINDOGlobal; SCIP; BARON; AMPL; LINDO; ANTIGONE

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