Research (What is it about?)	**The efficiency of Pareto suboptimal controllers**
UNN authors	*Balandin D.*
We find (The result)	For linear systems with N inputs and one target output it is formulated and prove necessary Pareto optimality conditions and synthesize Pareto suboptimal controllers for which relative losses compared to Pareto optimal controllers do not exceed $1-\sqrt{N}/N$ for each criterion.
Abstract	In real life problems that occur in engineering practice, one often encounters a situation when there are several different criteria for choosing a solution. In such problems, one has to find a set of ***non-improvable*** solutions that comprise the ***Pareto set***; these are solutions that provide a tradeoff between "conflicting" criteria, when the value of each partial indicator can't be improved without the deterioration of the rest. It is known however that in the conditions of controversial alternatives in most cases the task of exact Pareto optimization is extremely complex or unsolvable. So various approximate versions to solve this task have been proposed. But up until now there have been no works where the proposed solutions would be somehow compared with Pareto optimal solutions. For linear systems (controllers) with N inputs (criteria) and one target output we formulate and prove necessary Pareto optimality conditions and synthesize Pareto ***suboptimal controllers*** for which relative losses compared to Pareto optimal controllers do not exceed $1-\sqrt{N}/N$ for each criterion. This approach is generalized to the case where disturbances acting on different inputs are allowed to form coalitions, and to the corresponding multi-criteria problems. The efficiency of the approach is illustrated by the example of double-inverted pendulum.

Representative articles 2017-2018, quartiles	1. *Balandin D.V., Kogan M. M.* Pareto suboptimal controllers in multi-objective disturbance attenuation problems. Automatica. **84**. 56-61 (2017). 2. *Balandin D.V., Kogan M. M.* Pareto suboptimal controllers against coalitions of disturbances. Autom. Rem. Control. **78**(2). 197-216 (2017).	Q1 Q4
	Q-index (Qi) for the result	**2.5**
	medial orange	

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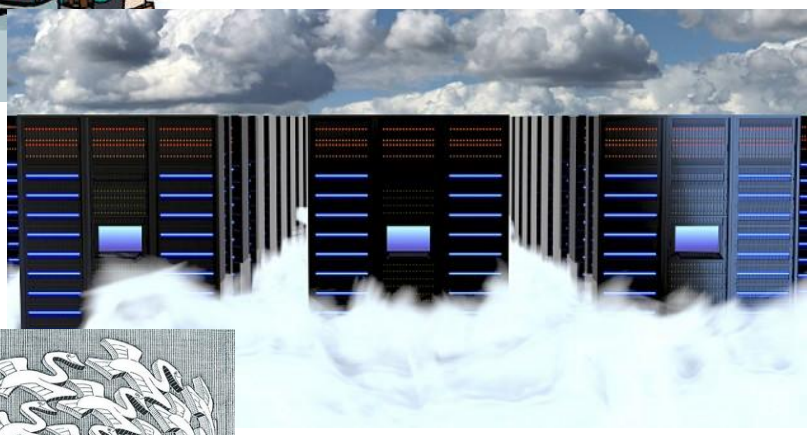
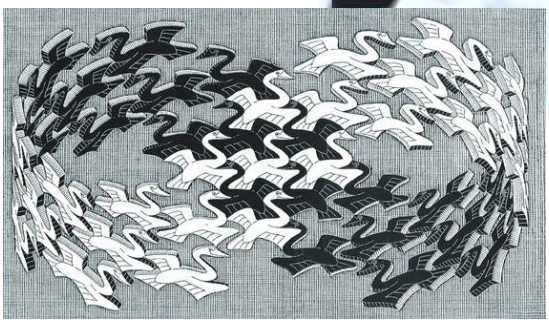
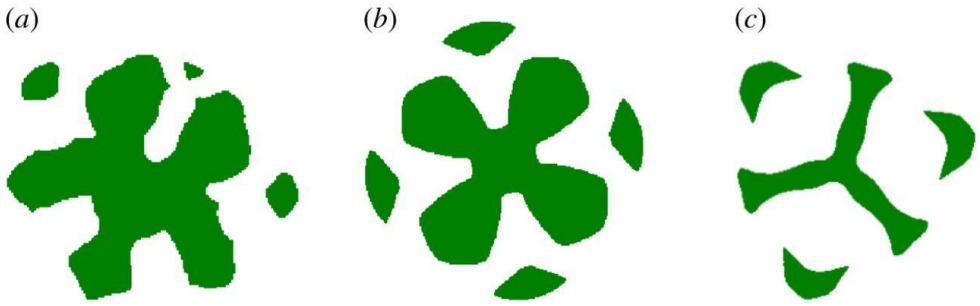
Multi criteria optimization problems.



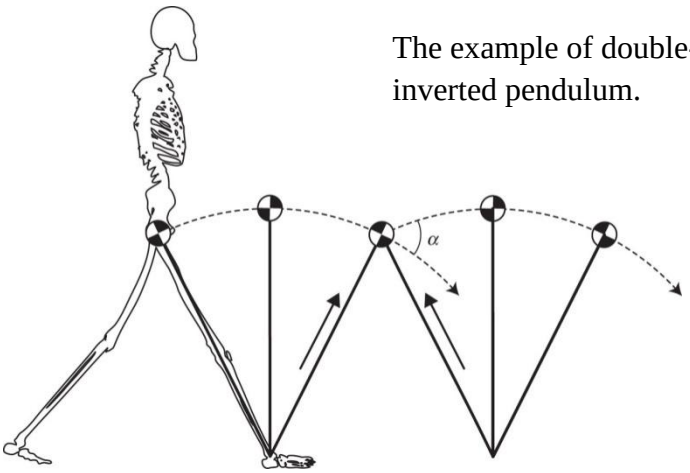


The problem of Pareto optimal decision…

Suboptimal algorithm:



$\mathbf{1 - \sqrt{N}/N}$ – the estimation of maximum relative losses for each criterion



The example of double-inverted pendulum.