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解决约束违背问题的一种自适应调整方法

An adaptive adjustment approach for solving breach issues of constraints

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中文关键词: 带约束的优化模型 约束条件超限 约束条件无效 自适应调整约束限方法 结构拓扑优化

英文关键词:constraint optimization violated constraints inactive constraints an adaptive constraint bounds adjustment approach structural topology optimization

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中文摘要:

带约束的优化问题的目的是要找到满足等式或者不等式约束的最优点。在某些情况下，优化求解得到的"最优点"可能会使得某个或某几个约束条件超出目标约束限，或者在所有约束条件中的最大值远远小于目标约束限。针对这一类问题，本文提出一种在寻优过程的每一次迭代中自适应调整约束限的方法，通过动态调整迭代过程中迭代模型约束限的值，将约束条件中最大值的约束条件变为等式约束，使得迭代解始终在可行域范围内，且收敛后的最优解不违背任何约束条件。本文将该方法成功应用于位移约束下结构重量最小化拓扑优化模型，原来不满足约束条件的情况在使用该方法后都能使约束得到满足，解决了约束条件被违背的问题。

英文摘要:

The constraint optimization aims to find optimum points that satisfy equality or inequality constraints.In some cases,one or several constraints at the "optimum points",which are obtained through solving the optimization problems,might be violated,or the maximum value among all of the constraints might be much less than the target constraint bound.In terms of these issues,this paper provided an adaptive constraint bounds adjustment approach,which was implemented in each iteration while seeking optimality.The constraint bounds of the iterative model were adjusted dynamically,and the constraint that had the maximum value among all constraints,was turned into an equality constraint.Therefore,the iterative solutions were always in feasible ranges,and no constraints were violated at the converged solution.This approach was implemented successfully on structural topology optimization of minimum weight with displacement constraints.The cases of the constraints unsatisfied before using the proposed approach were satisfied after using it and the constraint violation issues were addressed.

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