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基于量纲分析和最优设计的毁伤响应函数获取

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Acquisition of Damage Response Function Based on Optimal Design and Dimensional Method

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摘要

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摘要 毁伤响应函数的获取是毁伤效能评估中至关重要的研究内容,其主要研究方法是试验归纳。为在原型试验样本极少的条件下,获取高效的毁伤响应函数,本文一方面应用量纲分析开发物理模型信息,并应用缩比试验拓展试验技术;另一方面构建了缩比试验与原型试验之间差异的参数化模型和融合评估模型。在这些工作的基础上提出两种试验的联合一体化最优设计方法,科学地设计试验,提高试验的效费比。给出了相互差异建模和一体化最优设计的例子,说明了本文方法的优势。

关键词: 量纲分析 D-最优设计 毁伤效能评估 缩比试验 数据融合

Abstract: While evaluating damage efficiency, it is especially important to deduce the damage response function, which is mainly achieved by deduction from a variety of experiments. In order to get a valid damage response function on condition of a very limited number of prototype experiments, on the one hand, a dimensional method is used to exploit the information hidden in the physical model, and the reduced scale experiment is involved to develop the experiment technology; on the other hand, a parameter model based on the discrepancy between the reduced scale model and the prototype experiments is constructed, and then a fusion model is also constructed. Based on all of the work above, an integrative optimal design of the two kinds of experiments is developed to increase the efficiency of the experiments. Examples about the construction of a parameter model of the discrepancy and an integrative optimal design of experiments are given to show the superiority of the proposed method.

Keywords: dimensional method D-optimal design damage efficiency assessment reduced scale experiment data fusion

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