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# NASA TECH BRIEF

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## Peak Structural Response to Nonstationary Random Excitations

A study was conducted to establish analytical expressions for the response of structures to severe random nonstationary (transient) excitations. Impact loading on the landing gears and gust loading of an aircraft are typical examples of the excitations considered. Because of the relative severity of these excitations, the prediction of fatigue and maximum response characteristics is an important part of the task of structural analysis and design.

The study established the distribution function of peak response values, based on a frequency interpretation. The distribution can be approximated by the Weibull distribution with the aid of the Monte Carlo technique based on simulated peak values. By this means, simplified expressions for the expected fatigue damage and the asymptotic distribution function of the maximum peak response of structures were derived. Applications of these simplified expressions are demonstrated by numerical examples in the report of the study.

### Note:

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### Patent status:

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