STOCHASTIC SYSTEMS
WITH DISTRIBUTED PARAMETERS

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1. INTRODUCTION

The contribution is devoted to multispanded panel systems consisting of one-dimensional structure elements under a stationary random excitation assumed to be uncorrelated in space and time. Up to now, the dynamic response of such distributed systems is investigated by means of discretization methods using a normal mode approach or local approximations by finite elements. Since these methods principally lead to infinite series of coupled equations of motion, there is an enormously increasing requirement in the numerical evaluation and the identification procedure.
Therefore, we propose mathematical models with distributed parameters which simplifies basically the problems, mentioned above. In the stochastic case, the variances of the stationary response is described by a finite set of ordinary differential equations in dependence on the space coordinate leading to a finite element method analogous to the wellknown situation of deterministic structures under a statical loading.

2. STRUCTURES UNDER DISTRIBUTED NOISE

As a typical example, we consider a multispanned panel system under a white field excitation. It consists of a uniform string preloaded by an axial force $H_0$ and simply supported at its both ends. It has the length $l$, the mass $\mu$ and a transverse external damping $\beta$ per unit length. It is excited by a boundary layer turbulence $Q_{x,t}$ in dependence on the axial coordinate $x$ and the time variable $t$. As shown in Fig. 1, we assume an elastic bedding $c(x)$ which may be distributed or concentrated at several positions $a_i$ ($i=1,\ldots,n$). In the last case, the elastic bedding can be given by a sum over the delta functions $\delta(x-a_i)$ as noted in (1). Provided