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BOOK OF ABSTRACTS

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Acoustic radiation energy focus in a shell with liquid

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When the geometric dimensions of the cylindrical housing are much greater than the sound wavelength, the excitation zones. There is thus a focusing of penetrating acoustic radiation energy, which takes the form of a caustic surface. This results in a sharp concentration of the sound wave energy inside a liquid static part of the suspension, accompanied by a significant increase in the sound pressure level. Upon housing irradiation with a wide enough sound beam, which, by the way, is observed under operating conditions in the form of a reverberant space, the coincidence resonance may occur for both transverse and circumferential waves. Furthermore, the liquid static parts may also have the radial bands of sound radiation energy concentration as a result of interference phenomena.

Chi-squared goodness-of-fit tests: the optimal choice of grouping intervals

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When using the chi-square goodness-of-fit tests, the problem of choosing boundary points and the number of grouping intervals is always urgent, as the power of these tests considerably depends on the grouping method used. In this paper, the investigation of the power of the Pearson and Nikulin-Rao-Robson chi-square tests has been carried out for various numbers of intervals and grouping methods. The partition of the real line into equiprobable intervals is not an optimal grouping method, as a rule. It has been shown that asymptotically optimal grouping, for which the loss of the Fisher information from grouping is minimized, enables to maximize the power of the Pearson test against close competing hypotheses. In order to find the asymptotically optimal boundary points, it is possible to maximize some functional (the determinant, the trace or the minimum eigenvalue) of the Fisher information matrix for grouped data. The versions of asymptotically optimal grouping maximize the test power relative to a set of close competing hypotheses, but they do not insure the largest power against some given competing hypothesis. For the given competing hypothesis H_1, it is possible to construct the chi-squared test, which has the largest power for testing hypothesis H_0 against H_1. For example, in the case of the Pearson chi-square test, it is possible to maximize the non-centrality parameter for the given number of intervals. So, the purpose of this paper is to give the methods for the choice of optimal grouping intervals for chi-squared goodness-of-fit tests.
Keywords: chi-squared goodness-of-fit tests, optimal grouping, Fisher information, test power.