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Moment-Based Probability Modelling and Extreme Response Estimation The FITS Routine

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ABSTRACT

This report documents the use of the FITS routine, which provides automated fits of various analytical, commonly used probability models from input data. It is intended to complement the previously distributed FITTING routine documented in RMS Report 14 (Winterstein et al., 1994), which implements relatively complex four-moment distribution models whose parameters are fit with numerical optimization routines. Although these four-moment fits can be quite useful and faithful to the observed data, their complexity can make them difficult to automate within standard fitting algorithms. In contrast, FITS provides more robust (lower moment) fits of simpler, more conventional distribution forms. For each database of interest, the routine estimates the distribution of annual maximum response based on the data values and the duration, T , over which they were recorded. To focus on the upper tails of interest, the user can also supply an arbitrary lower-bound threshold, χ_{low} , above which a shifted distribution model—exponential or Weibull—is fit. (In estimating the annual maximum response, the program automatically adjusts for the decreasing rate of response events as the threshold χ_{low} is raised.)