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Approximate Techniques for Representing Nuclear Data Uncertainties

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Computational tools are currently available that utilize sensitivity and uncertainty (S/U) methods for a wide variety of applications in reactor analysis and criticality safety. S/U analysis generally requires knowledge of the underlying uncertainties in evaluated nuclear data, as expressed by covariance matrices; however, only a few nuclides currently have covariance information available in ENDF/B-VII. Although new covariance evaluations have recently become available for several important nuclides, a complete set of uncertainties for all materials needed in nuclear applications is unlikely to be available for at least several years. Therefore, if the potential power of S/U techniques is to be realized for near-term projects in advanced reactor design and criticality safety techniques, it is necessary to establish procedures for generating approximate covariance data. This paper will discuss an approach to create an applications-oriented covariance library consisting of available "high-fidelity" covariance information, supplemented by uncertainties obtained from approximate techniques, such as applying integral uncertainties to differential data within the corresponding energy range.