Constrained Quadratic Programming Method for Determining Shape Annealing Matrix of Ex-core Detectors

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Abstract

A constructive method for determining the Shape Annealing Matrix (SAM) of KSNP is developed with the constrained quadratic programming method with Tikhonov regularization parameter. The current method of SAM determination is using the ordinary least squares method which sometimes gives not physically meaningful and very noise sensitive solutions. Those phenomena come from the poor persistently exciting perturbations in power distribution changes during the start up of the reactor. To circumvent the difficulties, a constrained optimization algorithm is introduced. The method is based on the Tikhonov regularization to reduce the noise sensitivity and the constrained quadratic programming approach to bound the solution within the physical domain. The test results with the real measurement data from KSNPs show remarkable improvement in accuracy and robustness along the cycle burnup.