

Forward-Weighted CADIS Method for Global Variance Reduction

Introduction

- CADIS = Consisted Adjoint Driven Importance Sampling
- Adjoint function can be used as a measure of importance of a particle to some objective function.
 - Very effective for localized quantities
 - Not good for global distributions.
- Many methods use deterministic adjoint functions for MC VR.
 - CADIS method
- Global Solutions
 - Cannot use adjoint function
 - Cooper and Larsen used inverted Forward Flux as importance function
 - * Had some benefit.
 - * Evenly distributes particles throughout system, does not represent the expected contribution throughout the system.
 - When applied to a large realistic application, is not effective

Theory

- FW-Cadis method
 - Forward information used to define response to be used in deterministic adjoint calculation
 - * Then generate adjoint importance function for achieving uniform particle density throughout the system.
 - Possible to optimize for global quantities
 - * Flux, dose rate distribtuion
 - Also possible to optimize for semi-global responses depending on how adding is defined.
 - * Multiple localized detectors/spectra