MEng Project: Comparative Assessment of SMR Steam Generators

Project start: Fall 2025 or Winter 2026

Supervisor: David Warnica (MIE)

Steam generators of several small modular reactors (SMRs) are being designed with helical tube bundles that pose major challenges for design, fabrication, inspection, and maintenance. A configuration with straight tubes and helical baffles may be more feasible than helical tube bundles.

The objectives of this project are to size and rate an SMR steam generator with straight tubes and helical baffles using HTRI Xchanger Suite software [1], and to make a comparative assessment with published information about an SMR steam generator with a helical tube bundle [2]. Sizing and rating a more conventional TEMA steam generator with straight tubes and segmental baffles would be the basis for comparison and the starting configuration for modeling helical baffles.

MIE1032H, Heat Exchanger Design is a prerequisite for this project, but other heat-exchanger design experience would be considered.

If interested, please submit your CV, unofficial transcripts, and a single paragraph describing your interests in this project to David Warnica (david.warnica@utoronto.ca).

References:

1. Xchanger Suite Overview
   https://www.htri.net/software/xchanger-suite
2. Dumm, K., Zipper, E., & Keintzel, G. (1988). Steam generator design and development for a helium-cooled modular HTR (No. IWGGCR--15).
   https://inis.iaea.org/collection/NCLCollectionStore/_Public/31/057/31057145.pdf
   - This article describes an early version of the X-energy (Xe-100) steam generator which has helical coils and uses helium as the primary fluid.