Optimal design of an isotope separation system

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Résumé / Abstract
Cryogenic distillation cascades are proposed to be used today to separate hydrogen isotopes in the fuel cycle of a fusion reactor. It is necessary to design these cascades so that their tritium inventory is minimal. We have thus developed optimization tools in order to simultaneously optimize the structure and the operating parameters of these distillation sequences. This leads to the implementation of a mixed-integer nonlinear programming procedure in a process simulator. The application concerns the International Thermonuclear Experimental Reactor (ITER) isotope separation system. Successive simulation and optimization studies have been carried out which show the accuracy of the simulation and lead to the suggestion of a new arrangement of units for the cascade, with a higher number of columns.

Mots-clés anglais / English Keywords

Instrumentation; Design; Isotope separation; Cryogenics; Optimization; Hydrogen isotopes; ITER tokamak; Fuel cycle; Thermonuclear fuels; Computerized simulation;

Mots-clés français / French Keywords

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