Optimal design of a pilot OTEC power plant in Taiwan
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Abstract: In this paper, an optimal design concept has been utilized to find the best designs for a complex and large-scale ocean thermal energy conversion (OTEC) plant. The OTEC power plant under this study is divided into three major subsystems consisting of power subsystem, seawater pipe subsystem, and containment subsystem. The design optimization model for the entire OTEC plant is integrated from these subsystems under the considerations of their own various design criteria and constraints. The mathematical formulations of this optimization model for the entire OTEC plant are described. The design variables, objective function, and constraints for a pilot plant under the constraints of the feasible technologies at this stage in Taiwan have been carefully examined and selected. The numerical optimization method called Sequential Quadratic Programming (SQP) is selected to obtain the optimum results. The main purpose of this paper is to demonstrate the design procedure with the optimization techniques for engineering and economics in the OTEC plant so that anyone else can build upon their models according to their needs. (8 refs.)