

Stochastic Modelling of Hybrid Energy Systems

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Hybrid energy systems (HES) combining two or more types of energy resources (usually renewable and fuel) are becoming widespread. For the modelling and evaluating HES efficiency, we apply the queuing theory approach. As a model, we propose a queueing system with an unlimited number of servers and the second unstable service unit that determines a non-permanent energy source. The two cases of the model is considered systems with switching between service units and with join operation of two units. A non-stationary Poisson arrival process is proposed to model the flow of requests of electricity, that reflects the dynamics of electricity consumption over time. The Markov process of the system states is studied and the analytical formulas for the probability characteristics are presented. In addition, the simulation is performed. Numerical examples of generating electricity consumption volumes for different input parameters are presented.