Integrating economic load dispatch information into the blockchain smart contracts based on the fractional-order swarming optimizer	
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Abstract: The modern power generation systems are increasing their reliance on high penetrations of distributed energy resources (DERs). However, the optimal dispatching mechanisms mainly rely on central controls which receive the load demand information from the electricity utility providers and allocate the electricity production targets to participating generating units. The lack of transparency and control over the DER fuel inputs makes the physical power purchase agreements (PPAs) a cumbersome task. This research work proposes an innovative fractal moth flame optimization (FMFO) approach to tackle the problem of integrated load dispatch (ILD). The proposed methodology provides a mechanism to integrate the information of the proposed optimizer, i.e., FMFO into the smart contracts enabled by the blockchain technology. This problem entails the allocation of loads to power-generating units in a manner that minimizes the total generation cost in a decentralized manner. To improve the efficiency of dispatch operations in the presence of a substantial integration of wind energy, this study proposes a novel framework based on the principles of fractal heritage, drawing inspiration from the classical MFO method. To assess the effectiveness and adaptability of the algorithm suggested, various non-convex scenarios in the context of optimization for ILD are considered. These scenarios incorporate valve-point loading effects (VPLEs), capacity limitations, power plants with multiple fuel options, and the presence of stochastic wind (SW) power uncertainty, following a Weibull distribution. The findings demonstrate exceptional performance in terms of minimizing fuel generation costs compared to traditional algorithms.