US 20240213776A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2024/0213776 A1

CHEN et al. (43) Pub. Date: Jun. 27, 2024

(54) METHOD AND DEVICE FOR OPTIMAL POWER FLOW CALCULATION IN ELECTRIC POWER SYSTEM BASED ON GENERALIZED NASH EQUILIBRIUM

(71) Applicants: **STATE GRID ZHEJIANG ELECTRIC POWER CO., LTD**, Hangzhou (CN); **Zhejiang University**, Hangzhou (CN)

(72) Inventors: **Lei CHEN**, Hangzhou (CN); **Shufeng DONG**, Hangzhou (CN); **Qiang YANG**, Hangzhou (CN); **Jun LYU**, Beijing (CN); **Weiwei XU**, Hangzhou (CN); **Yihui SUN**, Hangzhou (CN); **Chongyou XU**, Hangzhou (CN); **Jingen SONG**, Hangzhou (CN); **Weifeng XU**, Hangzhou (CN); **Jun HUANG**, Hangzhou (CN)

(21) Appl. No.: **18/538,149**

(22) Filed: **Dec. 13, 2023**

(30) **Foreign Application Priority Data**

Dec. 14, 2022 (CN) 2022 1 1599868.9

Publication Classification

(51) **Int. Cl.**
H02J 3/06 (2006.01)

(52) **U.S. Cl.**
CPC ***H02J 3/06*** (2013.01); *H02J 2203/20* (2020.01)

(57) **ABSTRACT**

A method and device for optimal power flow calculation in power systems based on generalized Nash equilibrium are disclosed. The method comprises: determining first optimal power flow model corresponding to distribution network and second optimal power flow model corresponding to each microgrid; constructing a third optimal power flow model based on the first optimal power flow model, each second optimal power flow model and boundary coupling constraint condition; determining generalized Nash equilibrium solution corresponding to the third optimal power flow model; determining generalized Nash equilibrium constraint condition corresponding to collaborative objective function and the Nash equilibrium solution; determining fourth optimal power flow model corresponding to the collaborative objective function, with constraint condition including the generalized Nash equilibrium constraint condition; determining Pareto optimal solution corresponding to the fourth optimal power flow model to determine an optimal power flow. Accordingly, effectiveness of optimization management is improved.