



US 20240213777A1

(19) **United States**

(12) **Patent Application Publication**  
**LI et al.**

(10) **Pub. No.: US 2024/0213777 A1**

(43) **Pub. Date: Jun. 27, 2024**

(54) **DEVICE AND METHOD FOR LOOP CLOSING AND BREAKING OF POWER DISTRIBUTION GRID BASED ON DECOUPLED VOLTAGE REGULATION, AND POWER DISTRIBUTION GRID**

(71) Applicants: **STATE GRID JIANGSU ELECTRIC POWER RESEARCH INSTITUTE**, Nanjing, Jiangsu (CN); **JIANGSU ELECTRIC POWER RESEARCH INSTITUTE CO., LTD.**, Nanjing, Jiangsu (CN)

(72) Inventors: **Qun LI**, Nanjing, Jiangsu (CN); **Ningyu ZHANG**, Nanjing, Jiangsu (CN); **Qian ZHOU**, Nanjing, Jiangsu (CN); **Jiankun LIU**, Nanjing, Jiangsu (CN); **Jian LIU**, Nanjing, Jiangsu (CN); **Jing CHEN**, Nanjing, Jiangsu (CN); **Xinyao ZHU**, Nanjing, Jiangsu (CN); **Lei GAO**, Nanjing, Jiangsu (CN); **Peng LI**, Nanjing, Jiangsu (CN); **Jinjiao LIN**, Nanjing, Jiangsu (CN); **Jianhua ZHOU**, Nanjing, Jiangsu (CN)

(73) Assignees: **STATE GRID JIANGSU ELECTRIC POWER RESEARCH INSTITUTE**, Nanjing, Jiangsu (CN); **JIANGSU ELECTRIC POWER RESEARCH INSTITUTE CO., LTD.**, Nanjing, Jiangsu (CN)

(21) Appl. No.: **18/556,025**

(22) PCT Filed: **Feb. 10, 2022**

(86) PCT No.: **PCT/CN2022/075832**

§ 371 (c)(1),

(2) Date: **Oct. 18, 2023**

(30) **Foreign Application Priority Data**

May 13, 2021 (CN) ..... 202110524738.8

**Publication Classification**

(51) **Int. Cl.**  
**H02J 3/12** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **H02J 3/12** (2013.01)

(57) **ABSTRACT**

A device for loop closing and breaking of a power distribution grid based on decoupled voltage regulation is provided. The device comprises a voltage-regulation phase shifter, a control system, a voltage acquisition device and a loop closing switch. The voltage acquisition device acquires voltage signals on two sides of the loop closing switch performing a loop closing or breaking operation and transmits the voltage signals to the control system. The control system calculates a compensating voltage amplitude and phase-angle according to the voltage signals, and sends an instruction to the voltage-regulation phase shifter according to the compensating voltage amplitude and phase-angle. The voltage-regulation phase shifter outputs the compensating voltage amplitude and phase-angle according to the instruction from the control system, to compensate for a voltage difference between the two sides of the loop closing switch.

