

SESSION **LOCALIZATION OF LOW-FREQUENCY OSCILLATION SOURCES USING DATA OF** PARIS HE PHASOR MEASUREMENTS UNITS AND **DEVELOPMENT OF DAMPING METHODS OF LOW-FREQUENCY OSCILLATIONS** 2018 **PS 3** Savvatin Mikhail (Russia) **D**

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Cigré LOCALIZATION OF LOW FREQUENCY OSCILLATIONS SOURCES

A model of the real power system

The amplitude-frequency characteristics



3



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DEVELOPMENT OF DAMPING METHODS OF LOW-FREQUENCY OSCILLATIONS 1. CHANGE THE VOLTAGE SET POINT OF THE AUTOMATIC EXCITATION REGULATOR. **RESULTS.** 0.04

Waveforms of the oscillation frequency **before** the change prescribed set point of voltage.

Waveforms of the oscillation frequency **after** the change prescribed set point of voltage.

The moment of change the prescribed set point of the voltage

The duration of the transition process is reduced by 10 seconds in a specific scheme, when the voltage set point of the automatic excitation regulator is changed by 10% on the generators nearest to the source of the **disturbance**.





DEVELOPMENT OF DAMPING METHODS OF LOW-FREQUENCY OSCILLATIONS

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6

2. THE MODIFICATION OF THE ALGORITHM OF STABILIZATION AUTOMATIC EXCITATION REGULATOR OF STRONG ACTION.

. RESULTS.







ALL OBJECTIVES IN THE WORK WERE SOLVED:

- **THE PARAMETERS OF LOW-FREQUENCY OSCILLATIONS ARE IDENTIFIED**
- ✓ THE METHOD OF LOCALIZATION OF LOW-FREQUENCY OSCILLATION IS DEVELOPED
 ✓ METHODS OF LOW-FREQUENCY OSCILLATION DAMPING ARE DEVELOPED

APPROBATION OF DEVELOPED METHODS

The developed methods were verified using real PMUs data obtained by the WAMS at System Operator of the United Power System of Russia upon incurrence of technological disturbances in the Kola power system in 2016



The detected frequency of low-frequencies oscillations: 0.26 Hz



THANK YOU FOR ATTENTION.

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