Improving the accuracy of determining the location of power line damage using the least squares method.

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A method is considered that allows determining with sufficiently high accuracy the place of damage to the power line. The calculation of the location of the damage – line break can be performed using the resonance method. This method proceeds from the assumption that the property of a broken line is well described by a mathematical model representing a resonant contour. The initial data is the voltage at the beginning of the line recorded at the time of the accident. However, the resonant method is based on a simplified model of a long line, which does not take into account the active resistance. The new method includes an active resistance in the model of the oscillatory circuit. However, this approach leads to a flattening of the head of the peak of the amplitude-frequency response curve and a decrease in the accuracy of determining its maximum. Therefore, the calculation of the resonant frequency is performed by comparing the shape of the amplitude-frequency characteristic of the circuit with the voltage spectrum in the time domain, which is the neighborhood of the moment of rupture. The contour parameters are searched for using the least squares method. According to the contour parameters and linear parameters of the line, the distance from the beginning of the power line to the break point is calculated. The proposed method reduces the search area of the accident site by at least two times compared to the method taken as a reference.

Key words: oscillatory circuit, power line breakage, least squares method, resonance frequency, Q-factor of the oscillatory circuit, linear characteristics of the power line.