

Abstract—With the rapid transition of overhead lines to covered conductors, line break fault occurs more frequently in resonant grounding systems. Line break fault, especially with earthing, Requires comprehensive study. There are significant advantages for the detection of line break fault using steady-state voltage characteristics on both sides of the fault point. In this paper, a model is built for different types of single-phase line break fault in resonant grounding systems. Based on the fundamental analysis of single-phase line break fault without earthing, the single-phase line break fault with earthing at system/load side is also comprehensively studied. The neutral voltages are derived from the proposed model. The magnitudes, angles, and phase sequences of the three-phase voltages and line-to-line voltages are mathematically derived for both upstream and downstream of the fault point. The difference between single-phase line break fault and single-phase-to-earth fault is identified. The analysis is verified in the simulations. Built upon the analysis in this paper, the detection and location approaches for line break fault in resonant grounding systems can be further studied