An increase in the weight of the conductor in an AC transmission line due to external loading like ice, wind etc., increases the physical sag which in turn displaces the jump height and in a multi span conductor system with unequal loading leads to arching as well. There are situations where flashover may also take place when phase to phase distance becomes small or phase to tower distance becomes small because of icing on transmission lines. Hence monitoring the changes in conductor span between tower tie up’s needs to have a careful attention for its variations. This paper proposes an improved calculation using algebraic method to calculate the tension created in the line with its immediate sag effect considering ice and wind loading applied for both levelled and unlevelled spans. We see that the proposed method is able to arrive at horizontal tension within 6 iterations as compared with Newton Raphson method which takes 7 iterations and the error on application is only 0.0119% for horizontal tension on which the sag is dependent on.

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