SUMMARY

[0007] An aspect of the present disclosure provides a method of balancing an unbalanced power cable using a transformer that has one or more phases, comprising: selecting a voltage on a tap handle; disposing a first bushing on one or more phases at a different voltage than the selected voltage; and balancing the unbalanced power cable based on the disposition of the first bushing on the one or more phases at the different voltage.

[0008] Another aspect of the present disclosure provides a flat cable comprising: a plurality of conductors, wherein at least one of the plurality of conductors comprises an impedance value differing from impedance values of each of the remaining plurality of conductors; wherein the cable is converted from an unbalanced mode to a balanced mode by disposing a bushing on one or two or all three phases at a voltage for one or more electrical submersible pump applications downhole.

[0009] These and other objects, features and advantages of the exemplary embodiments of the present disclosure will become apparent upon reading the following detailed description of the exemplary embodiments of the present disclosure, when taken in conjunction with the appended claims.

WE CLAIM:

1. A method of balancing an unbalanced power cable using a transformer that has one or more phases, comprising:

selecting a voltage on a tap handle;

disposing a first bushing on one or more phases at a different voltage than the selected voltage; and

balancing the unbalanced power cable based on the disposition of the first bushing on the one or more phases at the different voltage.

2. The method of claim 1, further comprising transmitting, based on the different voltage, power to an electrical load.

3. The method of claim 2, wherein the electrical load comprises a permanent magnet, induction motor, a servomotor, or a switch reluctance motor.

4. The method of claim 1, wherein the different voltage is different from the selected voltage by a predetermined percentage.

5. The method of claim 1, wherein the power cable is balanced based on the disposition of the first bushing on the one or more phases at a voltage higher or lower than the selected voltage.

6. The method of claim 1, wherein the different voltage is less than 10 kV.

7. The method of claim 1, wherein the different voltage is fixed for the one or more phases based on an attachment of the first bushing to a transformer.

8. The method of claim 1, wherein the different voltage is fixed for three phases based on an attachment of the first bushing to a transformer.

9. The method of claim 1, further comprising implementing one or more turns on a transformer to fix the different voltage for the one or more phases.

10. The method of claim 7, wherein the transformer comprises a step up transformer or a step-down transformer.

11. The method of claim 7, wherein the transformer comprises one or more cores including an E lamination, I lamination, or a U-I lamination.

12. The method of claim 7, wherein the transformer comprises primary and secondary windings configured in a plurality of configurations.

13. The method of claim 12, wherein the plurality of configurations comprises a wye configuration, a delta configuration, or a mixed wye-delta configuration.

14. The method of claim 1, wherein one of a plurality of conductors of the power cable comprises an impedance value differing from impedance values of each of the remaining plurality of conductors.

15. The method of claim 1, further comprising adjusting the voltage by implementing one or more turns on a phase-shifting transformer.

16. The method of claim 1, further comprising adding impedance by utilizing a magnetic core of a transformer.

17. The method of claim 1, further comprising balancing voltage and current to an electrical load through one or more additional tap handles so as to allow a selection of a value exceeding a tap ratio.

18. The method of claim 1, further comprising selecting, via a second tap handle, one or more changes to line-to-line voltage.

19. The method of claim 1, further comprising adding two or more additional bushings to each of the one or more phases.

20. The method of claim 1, wherein the power cable comprises a flat power cable.

21. The method of claim 1, wherein the power cable is balanced for one or more electrical submersible pump applications downhole.

22. A flat cable, comprising:

a plurality of conductors, wherein at least one of the plurality of conductors comprises an impedance value differing from impedance values of each of the remaining plurality of conductors, wherein the cable is converted from an unbalanced mode to a balanced mode by disposing a bushing on one or more of three phases at a voltage for one or more electrical submersible pump applications downhole.

23. The flat cable of claim 22, wherein a length of the cable exceeds 12,000 feet.

24. The flat cable of claim 22, wherein a length of the cable is about 15,000 feet.

25. The flat cable of claim 22, further comprising one or more additional bushings disposed at each of second and third phases.

26. The flat cable of claim 22, wherein the voltage exceeds a value than that selected by a tap handle.

27. The flat cable of claim 22, wherein the cable is configured to transmit power to an electrical load.

28. The flat cable of claim 27, wherein the electrical load comprises a permanent magnet, induction motor, a servomotor, or a switch reluctance motor.

29. The flat cable of claim 22, wherein the plurality of conductors are sequentially arranged on a horizontal axis.

30. The flat cable of claim 22, wherein the cable comprises a width of about 1.5 inches and a thickness of about 0.5 inches.

31. The flat cable of claim 22, wherein the cable is injected into a length of coiled tubing.