probe, individual power sources of the plurality of power sources configured to excite the guided surface waveguide probe at a respective different frequency; the guided surface waveguide probe being adjusted to launch a plurality of guided surface waves along a lossy conducting medium, the plurality of guided surface waves comprising guided surface waves at the respective different frequencies of the individual power sources; and a feed network electrically coupled to a charge terminal of the guided surface waveguide probe, wherein for each guided surface wave, the feed network is configured to provide a respective phase delay (Φ) that matches a respective wave tilt angle (Ψ) associated with a respective complex Brewster angle of incidence ($\theta_{i,B}$) associated with the lossy conducting medium in the vicinity of the guided surface waveguide probe. In some embodiments, the individual power sources are directly coupled to the guided surface waveguide probe. In some embodiments, the individual power sources are inductively coupled to the surface waveguide probe. In some embodiments, the system comprises a respective isolation component disposed between the guided surface waveguide probe and at least one individual power source. In some embodiments, the respective isolation component comprises an isolator, a bandpass filter, a directional coupler, a narrow band coupler, a circulator, or an amplifier. In some embodiments, the guided surface waveguide probe comprises a charge terminal being elevated over a lossy conducting medium and being configured to generate at least one resultant field that synthesizes a wave front incident at a complex Brewster angle of incidence ($\theta_{i,B}$) of the lossy conducting medium, the charge terminal being excited by at least one of the plurality of power sources. In some embodiments, the system comprises a compensation terminal elevated over the lossy medium and below the charge terminal, wherein the charge terminal is coupled to a coil at a first tap and the compensation terminal being coupled to the coil at a second tap that is variable via a switching mechanism. In some embodiments, the switching mechanism comprises a plurality of terminals directly coupled to a plurality of tabs along the coil. In some embodiments, at least one of a position of the first tap or a position of the second

to provide a voltage to the charge terminal; a first power source coupled to the charge terminal via the first feed network, the first power source exciting the charge terminal at a first frequency; and a second power source coupled to the charge terminal via the second feed network, the second power source exciting the charge terminal at a second frequency different from the first frequency; wherein the guided surface waveguide probe is adjusted to simultaneously launch a first guided surface wave at the first frequency along a lossy conducting medium and a second guided surface wave at the second frequency along the lossy conducting medium; and wherein the guided surface wave guide probe generates: a first resultant field having a first complex angle of incidence at least at a first Hankel crossover distance from the guided surface waveguide probe, the first Hankel crossover distance based at least in part on the first frequency, and a second resultant field having a second complex angle of incidence at least at a second Hankel crossover distance from the guided surface waveguide probe, the second Hankel crossover distance based at least in part on the second frequency. In some embodiments, the guided surface waveguide probe further comprises a first N-plexer and a second N-plexer, the charge terminal being coupled to both the first feed network and the second feed network via the first N-plexer, and the compensation terminal being coupled to the first feed network and the second feed network via the second N-plexer. In some embodiments, the compensation terminal is coupled to the first feed network via a first switching mechanism device configured to vary excitation of the compensation terminal based at least in part on at least one of a current measurement associated with the first feed network, a ground parameter measurement, or a first field measurement corresponding to the first frequency; and the compensation terminal is coupled to the second feed network via a second switching mechanism configured to vary excitation of the compensation terminal based at least in part on a second current measurement associated with the second feed network, the ground parameter measurement, or a second field measurement corresponding to the second frequency. In some embodiments, the first guided surface wave and the second guided surface wave have a respective field strength contour that decays exponentially as a function of distance

from the guided surface waveguide probe. In some embodiments, the guided surface wave guide probe generates a first resultant field having a first complex angle of incidence at least at a first Hankel crossover distance from the guided surface waveguide probe, the first Hankel crossover distance based at least in part on the first frequency, and a second resultant field having a second complex angle of incidence at least at a second Hankel crossover distance from the guided surface waveguide probe, the second Hankel crossover distance based at least in part on the second frequency.

[0007] In another embodiment, a method, comprises exciting a guided surface waveguide probe with a plurality of signals having different respective frequencies, the guided surface waveguide probe positioned over a lossy medium; and launching a plurality of guided surface waves at the different respective frequencies in the lossy medium, each of the plurality of guided surface waves having a respective field strength contour that decays exponentially as a function of a distance from the guided surface waveguide probe; and wherein exciting the guided surface waveguide probe generates a plurality of resultant fields having a complex angle of incidence at least at a respective Hankel crossover distance from the guided surface waveguide probe, each of the plurality of resultant fields corresponding to a respective one of the plurality of signals. In some embodiments, the lossy medium is a terrestrial medium and the plurality of guided surface waves propagate along an interface of an atmospheric medium and the terrestrial medium. In some embodiments, the plurality of guided surface waves are launched simultaneously. In some embodiments, exciting the guided surface waveguide probe generates a plurality of resultant fields having a complex angle of incidence at least at a respective Hankel crossover distance from the guided surface waveguide probe, each of the plurality of resultant fields corresponding to a respective one of the plurality of signals. In some embodiments, the guided surface waveguide probe comprises a charge terminal elevated over the lossy conducting medium configured to generate at least one resultant field that synthesizes a wave front

CLAIMS

Therefore, the following is claimed:

1. A system, comprising:

a guided surface waveguide probe;

a plurality of power sources coupled to the guided surface waveguide probe, individual power sources of the plurality of power sources configured to excite the guided surface waveguide probe at a respective different frequency;

the guided surface waveguide probe being adjusted to launch a plurality of guided surface waves along a lossy conducting medium, the plurality of guided surface waves comprising guided surface waves at the respective different frequencies of the individual power sources; and

a feed network electrically coupled to a charge terminal of the guided surface waveguide probe, wherein for each guided surface wave, the feed network is configured to provide a respective phase delay (Φ) that matches a respective wave tilt angle (Ψ) associated with a respective complex Brewster angle of incidence ($\theta_{i,B}$) associated with the lossy conducting medium in the vicinity of the guided surface waveguide probe.

2. The system of claim 1, wherein the individual power sources are directly coupled to the guided surface waveguide probe.

3. The system of claim 1, wherein the individual power sources are inductively coupled to the surface waveguide probe.

4. The system of claim 1, comprising a respective isolation component disposed between the guided surface waveguide probe and at least one individual power source.

5. The system of claim 4, wherein the respective isolation component comprises an isolator, a bandpass filter, a directional coupler, a narrow band coupler, a circulator, or an amplifier.

6. The system of claim 1, wherein the charge terminal is elevated over a lossy conducting medium and is configured to generate, for each guided surface wave, a respective resultant field that synthesizes a respective wave front incident at the respective complex Brewster angle of incidence ($\theta_{i,B}$) of the lossy conducting medium for the guided surface wave, the charge terminal being excited by at least one of the plurality of power sources.

7. The system of claim 6, comprising a compensation terminal elevated over the lossy medium and below the charge terminal, wherein the charge terminal is coupled to a coil at a first tap and the compensation terminal being coupled to the coil at a second tap that is variable via a switching mechanism.

8. The system of claim 7, wherein the switching mechanism comprises a plurality of terminals directly coupled to a plurality of taps along the coil.

9. The system of claim 7, wherein at least one of a position of the first tap or a position of the second tap are adjustable based at least in part on at least one of a current measurement associated with a ground stake of the guided surface waveguide probe, a ground parameter measurement, a field measurement, power supplied by a respective one of the power sources, or power consumed by a load.

10. The system of claim 7, comprising a filter mechanism disposed between an output of the switching mechanism and the compensation terminal, the filter mechanism configured to filter frequencies outside a predefined frequency band.

11. The system of claim 1, wherein the guided surface waveguide probe comprises:

the charge terminal coupled to a coil configured to be excited by the individual power sources;

a first compensation plate coupled to the coil at a first tap; and

a second compensation plate coupled to the coil at a second tap;

wherein the first tap is adjusted based at least in part upon a first respective different frequency associated with a first individual power source of the plurality of power sources; and

wherein the second tap is adjusted based at least in part upon a second respective different frequency associated with a second individual power source of the plurality of power sources.

12. A system, comprising:

a guided surface waveguide probe comprising:

a charge terminal elevated over a lossy conducting medium;

a compensation terminal positioned below the charge terminal;

first and second feed networks coupled to the charge terminal and the compensation terminal and configured to provide a voltage to the charge terminal;

a first power source coupled to the charge terminal via the first feed network, the first power source exciting the charge terminal at a first frequency; and

a second power source coupled to the charge terminal via the second feed network, the second power source exciting the charge terminal at a second frequency different from the first frequency;

wherein the guided surface waveguide probe is adjusted to simultaneously launch a first guided surface wave at the first frequency along a lossy conducting medium and a second guided surface wave at the second frequency along the lossy conducting medium; and

wherein the guided surface wave guide probe generates:

a first resultant field having a first complex angle of incidence at least at a first Hankel crossover distance from the guided surface waveguide probe, the first Hankel crossover distance based at least in part on the first frequency, and

a second resultant field having a second complex angle of incidence at least at a second Hankel crossover distance from the guided surface waveguide probe, the second Hankel crossover distance based at least in part on the second frequency.

13. The system of claim 12, wherein the guided surface waveguide probe further comprises a first N-plexer and a second N-plexer, the charge terminal being coupled to both the first feed network and the second feed network via the first N-plexer, and the compensation terminal being coupled to the first feed network and the second feed network via the second N-plexer.

14. The system of claim 12, wherein the compensation terminal is coupled to the first feed network via a first switching mechanism device configured to vary excitation of the compensation terminal based at least in part on at least one of a current measurement associated with the first feed network, a ground parameter measurement, or a first field measurement corresponding to the first frequency; and

the compensation terminal is coupled to the second feed network via a second switching mechanism configured to vary excitation of the compensation terminal based at least in part on a second current measurement associated with the second feed network, the ground parameter measurement, or a second field measurement corresponding to the second frequency.

15. The system of claim 12, wherein the first guided surface wave and the second guided surface wave have a respective field strength contour that decays exponentially as a function of distance from the guided surface waveguide probe.

16. A method, comprising:

exciting a guided surface waveguide probe with a plurality of signals having different respective frequencies, the guided surface waveguide probe positioned over a lossy medium;

launching a plurality of guided surface waves at the different respective frequencies in the lossy medium, each of the plurality of guided surface waves having a respective field strength contour that decays exponentially as a function of a distance from the guided surface waveguide probe; and

wherein exciting the guided surface waveguide probe generates a plurality of resultant fields having a complex angle of incidence at least at a respective Hankel crossover distance from the guided surface waveguide probe, each of the plurality of resultant fields corresponding to a respective one of the plurality of signals.

17. The method of claim 16, wherein the lossy medium is a terrestrial medium and the plurality of guided surface waves propagate along an interface of an atmospheric medium and the terrestrial medium.

18. The method of claim 16, wherein the plurality of guided surface waves are launched simultaneously.

19. The method of claim 16, wherein the guided surface waveguide probe comprises a charge terminal elevated over the lossy conducting medium configured to generate at least one resultant field that synthesizes a respective wave front incident at a respective complex Brewster angle of incidence ($\theta_{i,B}$) of the lossy conducting medium.

20. The method of claim 19, wherein the guided surface waveguide probe comprises a feed network electrically coupled to the charge terminal, the feed network, for each resultant field, providing a respective phase delay (Φ) that matches a respective wave tilt angle (Ψ) associated with the respective complex Brewster angle of incidence ($\theta_{i,B}$) associated with the lossy conducting medium in the vicinity of the guided surface waveguide probe.