CLAIMS

1. A method for controlling pulsed power, comprising:

measuring a first pulse of delivered power from a power amplifier to obtain data;

generating a first signal to adjust a second pulse of delivered power, the first signal correlated to the data to minimize a power difference between a power set point and a substantially stable portion of the second pulse; and

generating a second signal to adjust the second pulse of delivered power, the second signal correlated to the data to minimize an amplitude difference between a peak of the second pulse and the substantially stable portion of the second pulse.

2. The method of claim 1 further comprising providing the second signal as an input to a voltage source, the voltage source providing a voltage to a voltage to power converter.

3. The method of claim 2 further comprising correlating the second signal to a time delay measured between the voltage source receiving a set point and the voltage to power converter outputting power.

4. The method of claim 1 further comprising calculating a pulse shape error between the peak of the first pulse and the substantially stable portion of the first pulse.

5. The method of claim 4 further comprising correlating the second signal to the pulse shape error.

6. The method of claim 1 further comprising calculating a power offset between the power set point and the substantially stable portion of the first pulse.

7. The method of claim 6 further comprising correlating the first signal to the power offset.

8. The method of claim 1 further comprising providing the first signal as an input to a voltage source, the voltage source providing a voltage to a voltage to power converter.

9. The method of claim 8 further comprising correlating the first signal to a duty cycle input of the voltage source.

10. A method of power delivery, comprising:

delivering power from a power delivery system in a continuous-wave mode to a load;

generating a signal in a feedback loop to control the delivered power, the signal correlated to a power control algorithm; and

adjusting a single variable in the power control algorithm to transition the delivered power from the continuous-wave mode to a pulsed mode.

11. The method of claim 10 further comprising activating a switch in the feedback loop based on an input corresponding to the single variable, the switch in electrical communication with a power amplifier.

12. The method of claim 10 further comprising filtering the signal in the feedback loop to provide a substantially stable power measurement.

13. The method of claim 10 further comprising providing the signal as an input to a voltage source, the voltage source providing a voltage to a voltage to power converter.

14. The method of claim 13 wherein the signal is a duty cycle input of the voltage source.

15. The method of claim 10 further comprising calculating a power offset between a power set point and the delivered power.

16. The method of claim 10 further comprising measuring the delivered power to obtain data.

17. The method of claim 16 further comprising generating a second signal to adjust a shape of delivered pulsed power, the second signal correlated to the data to minimize an amplitude difference between a peak of a pulse and a substantially stable portion of the pulse.

18. The method of claim 17 further comprising correlating the second signal to a time delay measured between a voltage source receiving a set point and a voltage to power converter outputting power.

19. The method of claim 16 further comprising correlating the signal to the data to minimize a power difference between a power set point and a substantially stable portion of a pulse.

20. A method of power delivery, comprising:

delivering power from a power delivery system in a continuous-wave mode to a load;

measuring power delivered to the load;

generating a signal indicative of the power delivered using a feedback loop to control amplitude of the power delivered, the signal corresponding to a power control algorithm;

adjusting a single variable in the power control algorithm to deliver pulsed power to the load via the same feedback loop.

21. The method of claim 20 further comprising activating a switch in the feedback loop based on an input corresponding to the single variable, the switch in electrical communication with a power amplifier.

22. The method of claim 20 further comprising filtering the signal in the feedback loop to provide a substantially stable power measurement.

23. The method of claim 20 further comprising providing the signal as an input to a voltage source, the voltage source providing a voltage to a voltage to power converter.

24. The method of claim 23 further comprising correlating the signal to a duty cycle input of the voltage source.

25. The method of claim 20 further comprising calculating a power offset between a power set point and the delivered power.

26. The method of claim 20 further comprising measuring the delivered power to obtain data.

27. The method of claim 26 further comprising generating a second signal to adjust a shape of delivered pulsed power, the second signal correlated to the data to minimize an amplitude difference between a peak of a pulse and a substantially stable portion of the pulse.

28. The method of claim 27 further comprising correlating the second signal to a time delay measured between a voltage source receiving a set point and a voltage to power converter outputting power.

29. The method of claim 26 further comprising correlating the signal to the data to minimize a power difference between a power set point and a substantially stable portion of a pulse.

30. A system for delivering pulsed or continuous-wave RF power to a load, comprising:

a voltage to power converter coupled to an output of a voltage source, the voltage to power converter adapted to generate the pulsed RF power or the continuous-wave RF power;

a RF power amplifier coupled to an output of the voltage to power converter, the RF power amplifier adapted to deliver RF power to the load;

a pulse shape control loop coupled to an output of the RF power amplifier and a first input of the voltage source, the pulse shape control loop adapted to minimize an amplitude difference between a peak of the pulsed power and a substantially stable portion of the pulsed power, the pulse shape control loop adapted to operate when the pulsed RF power is in a first mode; and

a power set point control loop coupled to the output of the RF power amplifier and a second input of the voltage source, the power set point control loop adapted to minimize a power difference between a RF power set point and the RF power delivered to the load.

31. The system of claim 30 wherein the power set point control loop is coupled to an output of the voltage source.

32. The system of claim 31 wherein the power set point control loop comprises a voltage offset circuit, the voltage offset circuit configured to measure a voltage offset between a voltage output from the voltage source and a voltage setpoint from the power set point control loop.

33. The system of claim 30 wherein the power set point control loop comprises a switch in electrical communication with the output of the RF power amplifier.

34. The system of claim 33 wherein the switch has a switching frequency correlated to a pulsing frequency of the pulsed RF power.

35. The system of claim 30 further comprising a matching network coupled to an output of the voltage to power converter and an input of the load.

36. The system of claim 30 wherein the power set point control loop comprises an output conditioning module coupled to the second input of the voltage source and the pulse set point control loop, the output conditioning module providing a duty cycle input to the voltage source.

37. The system of claim 30 wherein the voltage source is a buck regulator.

38. The system of claim 30 wherein the power set point control loop comprises a digital-to-analog converter.

39. A system for delivering pulsed or continuous-wave RF power to a load, comprising:

a voltage to power converter coupled to an output of a voltage source, the voltage to power converter adapted to produce the pulsed RF power or the continuous-wave RF power;

a RF power amplifier coupled to an output of the voltage to power converter, the RF power amplifier adapted to deliver RF power to the load;

a first control circuit coupled to an output of the RF power amplifier and a current set point output; and

a second control circuit coupled to an input of the voltage source and an output of the voltage source, the second control circuit in electrical communication with the current set point output,

wherein the first and second control circuits, in combination, are adapted to minimize a power difference between a RF power set point and the RF power delivered to the load.

40. The system of claim 39 further comprising a third control circuit coupled to the output of the voltage source and a voltage set point output of the second control circuit.

41. The system of claim 39 wherein the first control circuit further comprises a switch in electrical communication with the output of the RF power amplifier.

42. The system of claim 39 further comprising at least one filter in electrical communication with the switch and the output of the RF power amplifier.

43. The system of claim 42 wherein the at least one filter is adapted to provide a substantially stable power measurement.

44. The system of claim 39 further comprising at least one feed-forward input coupled to the second control circuit.

45. The system of claim 44 wherein the at least one feed-forward input comprises a voltage set point input.

46. The system of claim 44 wherein the at least one feed-forward input comprises a current set point input.

47. The system of claim 39 wherein the second circuit comprises a conditioning module, the conditioning module providing a duty cycle input to the voltage source.

48. The system of claim 39 further comprising a pulse shape control loop coupled to an output of the RF power amplifier and a second input of the voltage source, the pulse shape control loop adapted to minimize an amplitude difference between a peak of the pulsed power

and a substantially stable portion of the pulsed power, the pulse shape control loop adapted to operate when the pulsed RF power is in a first mode.

CLAIMS

1. A method for controlling pulsed power, comprising:

measuring a first pulse of delivered power from a power amplifier to obtain data;

generating a first signal to adjust a second pulse of delivered power, the first signal correlated to the data to minimize a power difference between a power set point and a substantially stable portion of the second pulse; and

generating a second signal to adjust the second pulse of delivered power, the second signal correlated to the data to minimize an amplitude difference between a peak of the second pulse and the substantially stable portion of the second pulse.

2. The method of claim 1 further comprising providing the second signal as an input to a voltage source, the voltage source providing a voltage to a voltage to power converter.

3. The method of claim 2 further comprising correlating the second signal to a time delay measured between the voltage source receiving a set point and the voltage to power converter outputting power.

4. The method of claim 1 further comprising calculating a pulse shape error between a peak of the first pulse and a substantially stable portion of the first pulse.

5. The method of claim 4 further comprising correlating the second signal to the pulse shape error.

6. The method of claim 1 further comprising calculating a power offset between the power set point and the substantially stable portion of the first pulse.

7. The method of claim 6 further comprising correlating the first signal to the power offset.

8. The method of claim 1 further comprising providing the first signal as an input to a voltage source, the voltage source providing a voltage to a voltage to power converter.

9. The method of claim 8 further comprising correlating the first signal to a duty cycle input of the voltage source.

10. A system for delivering pulsed or continuous-wave RF power to a load, comprising:

a voltage to power converter coupled to an output of a voltage source, the voltage to power converter adapted to generate the pulsed RF power or the continuous-wave RF power;

a RF power amplifier coupled to an output of the voltage to power converter, the RF power amplifier adapted to deliver RF power to the load;

a pulse shape control loop coupled to an output of the RF power amplifier and a first input of the voltage source, the pulse shape control loop adapted to minimize an amplitude difference between a peak of the pulsed power and a substantially stable portion of the pulsed power, the pulse shape control loop adapted to operate when the RF power is in a pulsed mode; and

a power set point control loop coupled to the output of the RF power amplifier and a second input of the voltage source, the power set point control loop adapted to minimize a power difference between a RF power set point and the RF power delivered to the load.

11. The system of claim 10 wherein the power set point control loop is coupled to an output of the voltage source.

12. The system of claim 11 wherein the power set point control loop comprises a voltage offset circuit, the voltage offset circuit configured to measure a voltage offset between a voltage output from the voltage source and a voltage setpoint from the power set point control loop.

13. The system of claim 10 wherein the power set point control loop comprises a switch in electrical communication with the output of the RF power amplifier.

14. The system of claim 13 wherein the switch has a switching frequency correlated to a pulsing frequency of the pulsed RF power.

15. The system of claim 10 further comprising a matching network coupled to an output of the voltage to power converter and an input of the load.

16. The system of claim 10 wherein the power set point control loop comprises an output conditioning module coupled to the second input of the voltage source and the pulse set point control loop, the output conditioning module providing a duty cycle input to the voltage source.

17. The system of claim 10 wherein the voltage source is a buck regulator.

18. The system of claim 10 wherein the power set point control loop comprises a digital-to-analog converter.

19. A system for delivering pulsed or continuous-wave RF power to a load, comprising:

a voltage to power converter coupled to an output of a voltage source, the voltage to power converter adapted to produce the pulsed RF power or the continuous-wave RF power;

a RF power amplifier coupled to an output of the voltage to power converter, the RF power amplifier adapted to deliver RF power to the load;

a first control circuit coupled to an output of the RF power amplifier and a current set point output;

a second control circuit coupled to a first input of the voltage source and an output of the voltage source, the second control circuit in electrical communication with the current set point output,

wherein the first and second control circuits, in combination, are adapted to minimize a power difference between a RF power set point and the RF power delivered to the load; and

a pulse shape control loop coupled to an output of the RF power amplifier and a second input of the voltage source, the pulse shape control loop adapted to minimize an amplitude difference between a peak of the pulsed power and a substantially stable portion of the pulsed power, the pulse shape control loop adapted to operate when the RF power is in a pulsed mode.

20. The system of claim 19 further comprising a third control circuit coupled to the output of the voltage source and a voltage set point output of the second control circuit.

21. The system of claim 19 wherein the first control circuit further comprises a switch in electrical communication with the output of the RF power amplifier.

22. The system of claim 19 further comprising at least one filter in electrical communication with a switch and the output of the RF power amplifier.

23. The system of claim 22 wherein the at least one filter is adapted to provide a substantially stable power measurement.

24. The system of claim 19 further comprising at least one feed-forward input coupled to the second control circuit.

25. The system of claim 24 wherein the at least one feed-forward input comprises a voltage set point input.

26. The system of claim 24 wherein the at least one feed-forward input comprises a current set point input.

27. The system of claim 19 wherein the second control circuit comprises a conditioning module, the conditioning module providing a duty cycle input to the voltage source.