CLAIMS

We claim:

1. A method comprising:

i) producing an acoustic field from a phased-transducer array having known relative positions and orientations;

ii) defining a plurality of control points, wherein each of the plurality of control points has a known spatial relationship relative to the phased-transducer array; and

iii) optimizing for a creation of desired field values in a known direction in a physical field of a quantity generated by the phased-transducer array through superposition of wave phases and amplitudes resulting from input driving coefficients given by an optimization process, wherein the quantity is an acoustic vector quantity.

2. The method as in claim 1, further comprising:

generating a further optimization matrix using a sum of eigensystems.

3. The method as in claim 1, further comprising:

generating a further optimization matrix using at least one null point in at least one field.

4. The method of claim 1, wherein at least one of the desired field values comprises velocities of particles at points in a medium hosting an acoustic wave.

5. The method of claim 1, wherein at least one of the desired field values comprises momentum in an acoustic wave.

6. The method of claim 1, further comprising:

generating further optimization using first values to calculate a plurality of basis functions.

7. The method of claim 6, wherein the plurality of basis functions are used to realize at least one control point that specifies second values in the physical field, wherein the second values differ from the first values.

8. A method comprising:

i) producing an acoustic field from a phased-transducer array having known relative positions and orientations;

ii) defining a plurality of control points, wherein each of the plurality of control points has a known spatial relationship relative to the phased-transducer array; and

iii) optimizing for maximization of an absolute magnitude of desired field values along a known direction in a physical field of a quantity generated by the phased-transducer array through superposition of wave phases and amplitudes resulting from input driving coefficients given by the optimization process, wherein the quantity is an acoustic vector quantity.

9. The method as in claim 8, further comprising:

generating a further optimization matrix using a sum of eigensystems.

10. The method as in claim 8, further comprising:

generating a further optimization matrix using at least one null point in at least one field.

11. The method as in claim 8, wherein at least one of the desired field values comprises acoustic intensity.

12. The method as in claim 8, wherein at least one of the desired fields comprises acoustic energy flux vectors.

13. The method of claim 8, wherein at least one of the desired field values comprises velocities of particles at points in a medium hosting an acoustic wave.

14. The method of claim 8, wherein at least one of the desired field values comprises momentum in an acoustic wave.

15. The method of claim 8, further comprising:

generating further optimization using first values to calculate a plurality of basis functions.

16. The method of claim 15, wherein the plurality of basis functions are used to realize at least one control point that specifies second values in the physical field, wherein the second values differ from the first values.

17. A method comprising:

i) producing an acoustic field from a phased-transducer array having known relative positions and orientations;

ii) defining a plurality of control points, wherein each of the plurality of control points has a known spatial relationship relative to the phased-transducer array; and

iii) optimizing for substantial maximization of a weighted integral of at least one desired region of at least one physical field generated by the phased-transducer array through superposition of wave phases and amplitudes resulting from input driving coefficients given by an optimization process.

18. The method of claim 17, further comprising:

generating a further optimization matrix using a sum of eigensystems.

19. The method of claim 17, further comprising:

generating a further optimization matrix using at least one null point in at least one field.

20. The method of claim 17, wherein at least one of the desired regions of a field comprises a weighted acoustic intensity integral.

21. The method of claim 17, wherein at least one of the desired regions of a field comprises a weighted integral of acoustic energy flux vectors.

22. The method of claim 17, wherein at least one of the desired regions of a field comprises a weighted integral of acoustic pressure.

23. The method of claim 17, wherein at least one of the desired regions of a field comprises a weighted integral of velocities of particles at each point in a medium host to an acoustic wave.

24. The method of claim 17, wherein at least one of the desired regions of a field comprises a weighted integral of momentum in an acoustic wave.

25. The method of claim 17, further comprising:

generating a further optimization using first weighted integral values to calculate a plurality of basis functions.

26. The method of claim 25, wherein the plurality of basis functions are used to realize at least one control region that specifies second weighted integral values in the physical field, wherein the second weighted integral values differ from the first weighted integral values.