What is claimed is:

1. A polishing apparatus for polishing an object, comprising:

a polishing table configured to support a polishing pad;

a polishing head configured to press the object against a polishing surface of the polishing pad;

a liquid supply device configured to supply liquid onto the polishing surface;

a polishing-table rotating device configured to rotate the polishing table;

a polishing-head rotating device configured to rotate the polishing head;

a liquid monitoring device configured to obtain optical information contained in light from a plurality of points on the polishing surface;

an optical information analyzer configured to determine a distribution of amount of the liquid on the polishing surface from the optical information; and

an operation controller configured to control operations of the polishing apparatus,

wherein the operation controller is configured to instruct the liquid monitoring device to obtain first optical information of a plurality of points on the polishing surface before supply of the liquid, and further instruct the liquid monitoring device to obtain second optical information of a plurality of points on the polishing surface when the liquid is supplied, and

the optical information analyzer is configured to determine a first distribution from the first optical information, determine a second distribution from the second optical information, and determine a distribution of the amount of the liquid by subtracting the first distribution from the second distribution.

2. The polishing apparatus according to claim 1, wherein the operation controller is configured to instruct the liquid monitoring device to obtain the optical information of a plurality of points on the polishing surface at a plurality of points in time during polishing of the object, and

the optical information analyzer is configured to obtain a temporal transition of the distribution of the amount of the liquid on the polishing surface from the optical information of the plurality of points of the polishing surface obtained at the plurality of points in time.

3. The polishing apparatus according to claim 1, wherein the operation controller is configured to instruct the liquid monitoring device to obtain the optical information at an interval time before or after polishing of the object.

4. The polishing apparatus according to claim 3, wherein the operation controller is configured to instruct the liquid supply device to supply the liquid onto the polishing surface of the polishing pad while the liquid monitoring device is obtaining the optical information, the liquid being of a different type from a polishing liquid used for polishing of the object.

5. The polishing apparatus according to any one of claims 1 to 4, further comprising a light source configured to irradiating the polishing surface with light having one or more wavelengths in a range of 200 nm to 1100 nm.

6. The polishing apparatus according to any one of claims 1 to 5, wherein the liquid monitoring device has a light-detection sensor configured to measure quantity of light having one or more wavelengths in a range of 200 nm to 1100 nm.

7. The polishing apparatus according to claim 6, wherein the optical information analyzer is configured to determine the distribution of the amount of the liquid on the polishing surface based on measurement data of the quantity of light.

8. The polishing apparatus according to any one of claims 1 to 4, wherein the liquid monitoring device has an image sensor configured to generate a color image.

9. The polishing apparatus according to claim 8, wherein the optical information analyzer is configured to determine the distribution of the amount of the liquid on the polishing surface by analyzing the optical information which is a color distribution appearing on the color image.

10. The polishing apparatus according to any one of claims 1 to 9, wherein the liquid monitoring device is arranged so as to obtain the optical information of the plurality of points in a monitoring region located upstream of the polishing head in a rotation direction of the polishing table.

11. The polishing apparatus according to claim 2, wherein the operation controller is configured to calculate a difference between a plurality of distributions of the amount of the liquid on the polishing surface determined at the plurality of points in time during polishing of the object, and change polishing conditions for the object in a direction as to reduce the difference in distribution when the difference in distribution is larger than a permissible value.

12. The polishing apparatus according to claim 11, wherein the operation controller is configured to recalculate a difference between a plurality of distributions of the amount of the liquid determined during polishing of the object after the polishing conditions are changed, and stop operation of the polishing apparatus before polishing of a next object when the recalculated difference in distribution is larger than the permissible value.

13. The polishing apparatus according to claim 2, wherein the operation controller is configured to calculate a difference between a plurality of distributions of the amount of the liquid determined at the plurality of points in time during polishing of the object, and stop operation of the polishing apparatus before polishing of a next object when the difference in distribution is larger than a permissible value.

14. The polishing apparatus according to claim 2, wherein the operation controller is configured to calculate a difference between a plurality of distributions of the amount of the liquid determined at the plurality of points in time during polishing of the object, and change a pressing force of the polishing head against the object when the difference in distribution is larger than a permissible value.

15. A polishing apparatus for polishing an object, comprising:

a polishing table configured to support a polishing pad;

a polishing head configured to press the object against a polishing surface of the polishing pad;

a liquid supply device configured to supply liquid onto the polishing surface;

a polishing-table rotating device configured to rotate the polishing table;

a polishing-head rotating device configured to rotate the polishing head;

a liquid monitoring device configured to obtain optical information contained in light from a plurality of points on the polishing surface;

an optical information analyzer configured to determine a distribution of amount of the liquid on the polishing surface from the optical information; and

an operation controller configured to control operations of the polishing apparatus,

wherein the operation controller is configured to instruct the liquid monitoring device to obtain initial optical information of a plurality of points on the polishing surface of the polishing pad that has not been used for polishing yet and current optical information of a plurality of points on the polishing surface of the polishing pad that has been used for polishing,

the optical information analyzer is configured to determine an initial distribution of the amount of the liquid from the initial optical information, and determine a current distribution of the amount of the liquid on the polishing surface from the current optical information, and

the operation controller is configured to calculate a difference between the initial distribution and the current distribution.

16. The polishing apparatus according to claim 15, wherein the operation controller is configured to change polishing conditions for the object in a direction as to reduce the difference between the initial distribution and the current distribution of the amount of the liquid on the polishing surface when the difference is larger than a threshold value.

17. The polishing apparatus according to claim 16, wherein the operation controller is configured to recalculate a difference between the initial distribution of the amount of the liquid and a current distribution of the amount of the liquid that has been newly determined after the polishing conditions have been changed, and stop polishing operation of the polishing apparatus before polishing of a next object when the difference in distribution is larger than the threshold value.

18. The polishing apparatus according to claim 15, wherein the operation controller is configured to stop polishing operation of the polishing apparatus before polishing of a next object when the difference between the initial distribution and the current distribution of the amount of the liquid on the polishing surface is larger than a threshold value.

19. The polishing apparatus according to any one of claims 1 to 18, wherein the operation controller is configured to determine that an abnormality has occurred in the polishing apparatus when the distribution of the amount of the liquid on the polishing surface falls below a preset threshold distribution of the amount of the liquid.

20. The polishing apparatus according to any one of claims 1 to 19, wherein the liquid is one of a polishing liquid, pure water, a chemical liquid, and colored water.

21. A polishing method for polishing an object, comprising:

while rotating a polishing head and a polishing table supporting a polishing pad, pressing the object against a polishing surface of the polishing pad by the polishing head to polish the object;

before, during, or after polishing of the object, obtaining optical information contained in light from a plurality of points on the polishing surface, while supplying a liquid onto the polishing surface; and

determining a distribution of amount of the liquid on the polishing surface from the optical information,

wherein the distribution of the amount of the liquid is determined by subtracting a first distribution from a second distribution, the first distribution being determined from first optical information of a plurality of points on the polishing surface obtained before the supply of the liquid, and the second distribution being determined from second optical information of a plurality of points on the polishing surface obtained when the liquid is supplied.

22. The polishing method according to claim 21, wherein obtaining the optical information comprises obtaining the optical information of a plurality of points on the polishing surface at a plurality of points in time during polishing of the object while supplying the liquid onto the polishing surface, and

determining the distribution of the amount of the liquid comprises obtaining a temporal transition of the distribution of the amount of the liquid on the polishing surface from the optical information of the plurality of points on the polishing surface obtained at the plurality of points in time.

23. The polishing method according to claim 21, wherein obtaining the optical information comprises obtaining the optical information while supplying the liquid onto the polishing surface at an interval time before or after polishing of the object.

24. The polishing method according to claim 23, wherein the liquid supplied onto the polishing surface of the polishing pad while obtaining the optical information is a liquid of a different type from a polishing liquid used for polishing of the object.

25. The polishing method according to any one of claims 21 to 24, wherein the optical information is quantity of light from the polishing surface.

26. The polishing method according to any one of claims 21 to 24, wherein the optical information is a color distribution of the polishing surface.

27. The polishing method according to any one of claims 21 to 26, wherein obtaining the optical information comprises obtaining the optical information of the plurality of points in a monitoring region located upstream of the polishing head in a rotation direction of the polishing table.

28. The polishing method according to claim 22, further comprising:

calculating a difference between a plurality of distributions of the amount of the liquid at the plurality of points in time during polishing of the object; and

changing polishing conditions for the object in a direction as to reduce the difference in distribution when the difference in distribution is larger than a permissible value.

29. The polishing method according to claim 28, further comprising:

recalculating a difference between a plurality of distributions of the amount of the liquid determined at a plurality of points in time during polishing of the object after the polishing conditions are changed; and

stopping operation of a polishing apparatus before polishing of a next object when

the recalculated difference in distribution is larger than the permissible value.

30. The polishing method according to claim 22, further comprising:

calculating a difference between a plurality of distributions of the amount of the liquid determined at the plurality of points in time during polishing of the object; and

stopping operation of a polishing apparatus before polishing of a next object when the difference in distribution is larger than a permissible value.

31. The polishing method according to claim 22, further comprising:

calculating a difference between a plurality of distributions of the amount of the liquid determined at the plurality of points in time during polishing of the object; and

changing a pressing force of the polishing head against the object when the difference in distribution is larger than a permissible value.

32. A polishing method for polishing an object, comprising:

obtaining initial optical information of a plurality of points on a polishing surface while supplying a liquid onto the polishing surface of a polishing pad that has not been used for polishing yet;

determining an initial distribution of an amount of the liquid on the polishing surface from the initial optical information;

while rotating a polishing head and a polishing table supporting the polishing pad, pressing the object against the polishing surface of the polishing pad by the polishing head to polish the object;

obtaining current optical information of a plurality of points on the polishing surface while supplying the liquid onto the polishing surface of the polishing pad that has been used for polishing;

determining a current distribution of the amount of the liquid on the polishing surface from the current optical information; and

calculating a difference between the initial distribution and the current distribution.

33. The polishing method according to claim 32, further comprising:

changing polishing conditions for the object in a direction as to reduce the difference between the initial distribution and the current distribution of the amount of the liquid on the polishing surface when the difference is larger than a threshold value.

34. The polishing method according to claim 33, further comprising:

recalculating a difference between the initial distribution of the amount of the liquid and a current distribution of the amount of the liquid that has been newly determined after the polishing conditions have been changed; and

stopping operation of a polishing apparatus before polishing of a next object when the difference in distribution is larger than the threshold value.

35. The polishing method according to claim 32, further comprising:

stopping operation of a polishing apparatus before polishing of a next object when the difference between the initial distribution and the current distribution of the amount of the liquid on the polishing surface is larger than a threshold value.

36. The polishing method according to any one of claims 21 to 35, further comprising:

determining that an abnormality has occurred in a polishing apparatus when the distribution of the amount of the liquid falls below a preset threshold distribution of the amount of the liquid.

37. The polishing method according to any one of claims 21 to 35, wherein the liquid is one of a polishing liquid, pure water, a chemical liquid, and colored water.