WHAT IS CLAIMED IS:

1. A detection signal processing apparatus configured to process a detection signal of an eddy current sensor having an excitation coil configured to form an eddy current in an object to be detected, a first detection coil configured to detect the eddy current formed in the object to be detected, and a dummy coil or a second detection coil configured to detect the eddy current, the apparatus comprising:

a first converter configured to convert a first analog signal output by the first detection coil into a first digital signal;

a second converter configured to convert a second analog signal output by the dummy coil into a second digital signal, or a third converter configured to convert a third analog signal output by the second detection coil into a third digital signal; and

a detector which is a digital signal processing circuit configured to detect the first digital signal, and the second digital signal or the third digital signal.

2. The detection signal processing apparatus according to claim 1, wherein

the detector performs synchronous detection using a reference signal to output an obtained impedance,

the apparatus comprises a corrector configured to perform correction corresponding to a phase difference between the first digital signal and the reference signal with respect to the impedance obtained by the synchronous detection,

in an impedance plane in which a resistance component and a reactance component of the impedance correspond to respective axes of a coordinate system having two orthogonal coordinate axes, the phase difference corresponds to a phase angle of the impedance obtained in a reference state, and

the corrector outputs, as an impedance after correction, an impedance corresponding to a point obtained by rotating a point on the impedance plane corresponding to the impedance obtained by the detector, according to the phase angle in a predetermined direction on the impedance plane.

3. The detection signal processing apparatus according to claim 1, wherein

the detector performs synchronous detection using a reference signal,

the apparatus comprises a phase difference detector configured to detect a phase difference between the first digital signal and the reference signal, and a signal output circuit configured to output at least one of a plurality of the reference signals having phases different from each other, and

the signal output circuit is configured to output at least one of a plurality of the reference signals on a basis of the phase difference detected by the phase difference detector.

4. The detection signal processing apparatus according to any one of claims 1 to 3, wherein

at least one signal of the first analog signal and the second analog signal and/or the third analog signal is a differential signal.

5. The detection signal processing apparatus according to any one of claims 1 to 4, wherein

at least one of the first converter, and the second converter and/or the third converter performs oversampling.

6. The detection signal processing apparatus according to any one of claims 1 to 5, further comprising:

an exciter configured to supply, to the excitation coil, an excitation signal having jitter not larger than a predetermined value.

7. The detection signal processing apparatus according to any one of claims 1 to 6, further comprising:

a difference circuit configured to obtain a difference between the first digital signal and the second digital signal.

8. The detection signal processing apparatus according to claim 7, further comprising:

an adjuster configured to perform phase adjustment and/or amplitude adjustment between the first digital signal and the second digital signal,

wherein the difference circuit obtains a difference between the first digital signal and the second digital signal which are output by the adjuster.

9. The detection signal processing apparatus according to any one of claims 1 to 6, further comprising:

an adder configured to add the first digital signal and the third digital signal.

10. A polishing apparatus having the detection signal processing apparatus according to any one of claims 1 to 9 and configured to polish the object to be detected, the polishing apparatus comprising:

a polishing mechanism configured to polish the object to be detected;

the eddy current sensor configured to form the eddy current in the object to be detected and detect the formed eddy current to measure a film thickness of the object to be detected; and

a film thickness calculator configured to obtain the film thickness from a signal output by the detector.

11. A detection signal processing method of processing a detection signal of an eddy current sensor having an excitation coil configured to form an eddy current in an object to be detected, a first detection coil configured to detect the eddy current formed in the object to be detected, and a dummy coil or a second detection coil configured to detect the eddy current, the method comprising:

converting a first analog signal output by the first detection coil into a first digital signal;

converting a second analog signal output by the dummy coil into a second digital signal, or converting a third analog signal output by the second detection coil into a third digital signal; and

detecting the first digital signal, and the second digital signal or the third digital signal by a digital signal processing circuit.