While the description above refers to particular embodiments of the present invention, it will be understood that many modifications may be made without departing from the spirit thereof. The accompanying claims are intended to cover such modifications as would fall within the true scope and spirit of the present invention.

The presently disclosed embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims, rather than the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed:

1. A thermal analysis instrument comprising:

a heat reservoir made of a thermal conducting material and having a center;

temperature-varying means coupled to said heat reservoir for varying temperature of said heat reservoir according to a function of time, which function has a linear component that varies at a constant rate and an alternating component that has a given frequency and amplitude and modulates the linear component;

a thermally conductive support member disposed in said heat reservoir for supporting an unknown sample and a reference sample symmetrically with respect to said center of said reservoir, said thermally conductive support member forming heat flow paths;

first temperature difference-measuring means thermally coupled to said thermally conductive support member for measuring a heat flow in one of the heat flow paths between a given point close to the unknown sample and a first fixed point as a temperature difference, the first fixed point being spaced from the location of the unknown sample;

second temperature difference-measuring means thermally coupled to said thermally conductive support member for measuring a heat flow in another one of the heat flow paths between a given point close to the reference sample and a second fixed point as a temperature difference, the second fixed point being spaced from the location of the reference sample, said first and second temperature difference-measuring means being formed and located symmetrically with respect to said center of said reservoir;

sample temperature-measuring means thermally coupled to said support member for measuring temperature at a point that is located on said support member and is close to the unknown sample; and

recording means coupled to said first and second temperature difference-measuring means and said sample temperature-measuring means for recording outputs from said first temperature difference-measuring means, said second temperature difference-measuring means, and said sample temperature measuring means as a function of one of time and temperature of the unknown sample.

2. The thermal analysis instrument of claim **1**, wherein the alternating component is a sinusoidal wave.

3. The thermal analysis instrument of claim **1**, wherein a difference between the output from said first temperature difference-measuring means and the output from said second temperature difference-measuring means is used to provide a signal for differential scanning calorimetry.

4. The thermal analysis instrument of claim **1**, further comprising processor means for filtering output signals from said first temperature difference-measuring means, said second temperature difference-measuring means, and said sample temperature-measuring means, whereby each signal is divided into an AC component corresponding to the frequency of the alternating component, the AC component having an AC amplitude, and a low-frequency component independent of that frequency.

5. The thermal analysis instrument of claim **4**, wherein said processor means derive an indication of a heat capacity of the unknown sample according to a ratio of a difference between the AC amplitude of the output signal from said first temperature difference-measuring means and the AC amplitude of the output signal from said second temperature difference-measuring means to the AC amplitude of the output from said sample temperature-measuring means.

6. The thermal analysis instrument of claim **4**, wherein said processor means produce a total heat flow component signal which is a function of a difference between the low-frequency component of the output signal from said first temperature difference-measuring means and the low-frequency component of the output signal from said second temperature difference-measuring means.

7. The thermal analysis instrument of claim **6**, wherein said processor means derive an indication of a heat capacity of the unknown sample according to a ratio of a difference between the AC amplitude of the output signal from said first temperature difference-measuring means and the AC amplitude of the output signal from said second temperature difference-measuring means to the AC amplitude of the output from said sample temperature-measuring means.

8. The thermal analysis instrument of claim **7**, wherein said processor means derive an indication of heat flow delivered as a signal indicative of a component of the heat capacity based on the indication of heat capacity of the unknown sample derived by said processor means multiplied by an average change rate of the low-frequency component of the output signal from said sample temperature-measuring means.

9. The thermal analysis instrument of claim **8**, wherein said processor means further derive a kinetic component signal based on a difference between the value of the total heat flow component signal and the value of the signal indicative of a component of the heat capacity.

10. A thermal analysis method comprising:

providing a heat reservoir made of a thermal conducting material and having a center, and disposing a thermally conductive support member in the heat reservoir for supporting an unknown sample and a reference sample symmetrically with respect to the center of the reservoir, the thermally conductive support member forming heat flow paths;

varying the temperature in the heat reservoir according to a function of time, which function has a linear component that varies at a constant rate and an alternating component that has a given frequency and amplitude and modulates the linear component;

measuring a heat flow in a first one of the heat flow paths between a given point close to the unknown sample and a first fixed point as a first temperature difference, the first fixed point being spaced from the location of the unknown sample;

measuring a heat flow in a second one of the heat flow paths between a given point close to the reference sample and a second fixed point as a second temperature difference, the second fixed point being spaced from the location of the reference sample, the heat flows in the first and second heat flow paths being measured at locations which are symmetrical with respect to the center of the reservoir;