a transmission system thereby increasing the cost of delivered power. In severe cases, the instability can cause widespread blackouts.

Power oscillations may be detected by monitoring power flows through a transmission corridor or by monitoring system frequency. When one observes a time series plot of system frequency, for example, small oscillations are often visible even to an untrained observer. As these oscillations grow in magnitude, they may become more serious threats to stable power system operation.

According to additional aspects, power management devices **16** may be configured to detect power oscillations and to minimize or eliminate the power oscillations before problems occur.

Referring to FIG. **5**, an exemplary methodology executable by control circuitry **24** is shown according to one embodiment to detect power oscillations and implement corrective action responsive to the detection. Other methods are possible including more, less or alternative steps.

At a step S**40**, the control circuitry obtains the system frequency at a plurality of moments in time. One exemplary method of determining system frequency has been described previously. Monitoring system frequency may be used to detect power oscillations, having a respective oscillation frequency, and corresponding to flows of power intermediate different geographic portions of system **10**. The control circuitry may detect the oscillation frequency (e.g., typically 1-3 Hz) by detecting oscillations in the system frequency (e.g., the system frequency oscillating between 59 and 61 Hz at exemplary oscillation frequencies of 1-3 Hz).

At a step S**42**, the control circuitry decimates the system frequency data to a sample rate amendable to Fourier analysis in the described example. For example, data may be provided at a sampling rate of approximately 100 Hz and decimated to 20 Hz. Decimation increases resolution of the received data around the range of interest wherein power oscillations are expected to occur (e.g., 0-5 Hz).

At a step S**44**, the control circuitry low pass filters the data to remove extraneous data including noise associated with system operation and/or sampling. For 1-3 Hz data of interest in the described example, the control circuitry implementing the low pass filtering may have a −3 dB point of 5 Hz. Information of other ranges may be processed in other embodiments. The output from the low pass filtering includes oscillatory frequency components.

At a step S**46**, the control circuitry implements Fourier processing to yield information regarding the magnitude of the power oscillations at frequencies of interest. Exemplary Fourier processing includes Fast Fourier Transform (as shown in the illustrated example), Discrete Fourier Transform, and Continuous Fourier Transform. Other types of processing are possible.

At a step S**48**, the control circuitry determines whether the magnitude of the power oscillations exceeds an oscillation threshold. In one example, an oscillation threshold corresponding to 1% damping may be used. Percent damping may be a measure of the magnitude of the oscillation as commonly used in the trade.

If the condition of step S**48** is negative, the control circuitry may return to step S**40** to continue power oscillation monitoring.

If the condition of step S**48** is affirmative, the control circuitry may proceed to a step S**50** to take appropriate corrective action. As indicated, exemplary corrective action may include adjusting an electrical demand of the associated load via load shedding operations and/or load modulation operations.

More specifically, the control circuitry **24** is configured in one aspect to implement the corrective action in an attempt to reduce the magnitude of the power oscillations which may grow responsive to the dynamic configurations of electrical power distribution system **10** (e.g., power oscillations matching a resonant frequency of a configuration of the electrical power distribution system **10** at a particular moment in time).

One exemplary corrective action includes shedding load as described previously. For example, the amount of power consumed by the respective load **18** coupled with the device **16** may be reduced or ceased all together. The magnitude of the power oscillations may be reduced to an acceptable level as a result of the load shedding removing the resonant condition of the system **10**. In particular, the resonant frequency of the system **10** may be altered or changed a sufficient degree if a requisite amount of load is shed by one or more device **16** responsive to the monitoring of the power oscillations. Further, by simply reducing demand, the system **10** is less stressed and an occurring power oscillation may become stable without further measures. Alternately, the reduction in demand may "buy time" for human intervention by system operators to correct any underlying problems. Typically, a human operator may reconfigure the system **10** to mitigate power oscillations following the adjustment operations described herein. Following stabilization, loads **18** may be manually or automatically returned to operation, for example, using a timer.

In another exemplary arrangement, the amount of electrical energy applied to a load **18** by a respective device **16** may be modulated according to power oscillations in an effort to dampen the oscillations and to reduce the magnitude of the oscillations to an acceptable level. For example, the control circuitry **24** may determine the direction of the power flow by monitoring whether the system frequency is increasing or decreasing. Thereafter, the control system **24** may synchronize the modulation of the load **18** with the oscillation frequency. For example, if a power flow oscillation is swinging from a first geographic portion of the system **10** to a second geographic location of the system **10**, the devices **16** in the first geographic location could be changed from a load restore mode of operation to a load shed mode of operation and devices **16** in the second geographic location could be changed from a load shed mode of operation to a load restore mode of operation in an effort to dampen the power oscillations. Other embodiments are possible for monitoring and/or reducing power oscillations within system **10**.

In compliance with the statute, the invention has been described in language more or less specific as to structural and methodical features. It is to be understood, however, that the invention is not limited to the specific features shown and described, since the means herein disclosed comprise preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted in accordance with the doctrine of equivalents.

What is claimed is:

1. An electrical power distribution control method comprising:

applying electrical energy from an electrical power distribution system to a load;

varying a single threshold to comprise a plurality of different values at a plurality of respective moments in time, and wherein the single threshold corresponds to an electrical characteristic of the electrical energy; and

adjusting an amount of the electrical energy applied to the load as a result of the electrical characteristic of the electrical energy triggering one of the values of the