

What is claimed is:

1. A method of measuring stick slips and micro stalls in a down-hole mud motor, the method comprising:

positioning in a borehole a mud motor with an elastomeric stator and at least one fiber optic sensor within the elastomeric stator;

receiving a measurement from the fiber optic sensor corresponding to a strain within the elastomeric stator; and

processing the measurement to determine a frequency of at least one of a micro stall and a stick slip of the mud motor.

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

reporting the frequency of said at least one of a micro stall and a stick slip to a drilling operator.

3. The method as claimed in claim 2, further includes transmitting the frequency of said at least one of a micro stall and a stick slip up-hole from a down-hole computer to the drilling operator during the drilling, and the drilling operator using the frequency of said at least one of a micro stall and a stick slip to change drilling parameters for reducing the frequency of said at least one of a micro stall and a stick slip.

4. The method as claimed in claim 2, wherein the digital computer is a surface computer, and the method further includes logging the data from the fiber optic sensor in a down-hole memory during drilling, and after the drilling, down-loading the data from the down-hole memory to the surface computer, and the drilling operator using the

15. The system as claimed in claim 14, wherein the histogram includes at least a first frequency of the micro stalls, and at least a second frequency of the stick lips.

16. The system as claimed in claim 12, wherein the instructions, when executed by the data processor, cause the data processor to measure the frequencies of the micro stalls and stick lips by computing a Fourier Transform over an interval of time in order to convert the sensor data from the time domain to the frequency domain.

17. The system as claimed in claim 12, wherein the fiber optic sensor includes a Bragg grating, and the system further includes a spectrophotometer coupled to the fiber optic sensor, and wherein the instructions, when executed by the data processor, cause the data processor to measure the frequencies of the micro stalls and stick lips by processing data from the spectrophotometer to compute time-domain samples of peak wavelength in the spectrum of light reflected from the Bragg grating, and by computing frequencies of the micro stalls and stick lips by converting the time-domain samples of peak wavelength to the frequency domain.