



US 20050215902A1

(19) **United States**

(12) **Patent Application Publication**  
**Greenwood**

(10) **Pub. No.: US 2005/0215902 A1**

(43) **Pub. Date: Sep. 29, 2005**

(54) **SYSTEM AND TECHNIQUE FOR CHARACTERIZING FLUIDS USING ULTRASONIC DIFFRACTION GRATING SPECTROSCOPY**

on May 5, 2003. Provisional application No. 60/644,758, filed on Jan. 17, 2005.

**Publication Classification**

(76) Inventor: **Margaret S. Greenwood**, Richland, WA (US)

(51) **Int. Cl.<sup>7</sup>** ..... **A61B 8/00**; A61B 8/12;

A61B 8/14

(52) **U.S. Cl.** ..... **600/446**

Correspondence Address:

**WOODARD, EMHARDT, MORIARTY, MCNETT & HENRY LLP**  
**BANK ONE TOWER/CENTER**  
**111 MONUMENT CIRCLE, SUITE 3700**  
**INDIANAPOLIS, IN 46204-5137 (US)**

(57) **ABSTRACT**

A system for determining property of multiphase fluids based on ultrasonic diffraction grating spectroscopy includes a diffraction grating on a solid in contact with the fluid. An interrogation device delivers ultrasound through the solid and a captures a reflection spectrum from the diffraction grating. The reflection spectrum exhibits peaks whose relative size depends on the properties of the various phases of the multiphase fluid. For example, for particles in a liquid, the peaks exhibit dependence on the particle size and the particle volume fraction. Where the exact relationship is known a priori, data from different peaks of the same reflection spectrum or data from the peaks of different spectra obtained from different diffraction gratings can be used to resolve the size and volume fraction.

(21) Appl. No.: **11/038,843**

(22) Filed: **Jan. 19, 2005**

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 10/430,474, filed on May 6, 2003, now Pat. No. 6,877,375.

(60) Provisional application No. 60/378,530, filed on May 6, 2002. Provisional application No. 60/467,878, filed

