



(57) **Abrégé(suite)/Abstract(continued):**

mixture 12 flowing in the pipe 14. The pressure sensors 15 - 18 provide acoustic pressure signals $P_1(t) - P_N(t)$ to a signal processing unit 30 which determines the speed of sound $a_{\text{mix}}(\omega)$ of the particle/fluid mixture 12 in the pipe 14 using acoustic spatial array signal processing techniques. The primary parameters to be measured include fluid/particle concentration, fluid/particle mixture volumetric flow, and particle size. Frequency based sound speed is determined utilizing a dispersion model to determine the parameters of interest. the calculating the at least one parameter uses an acoustic pressure to calculate

**Apparatus and Method for Measuring Parameters of a Mixture Having Solid Particles
Suspended in a Fluid Flowing in a Pipe**

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25 **Technical Field**

This invention relates to an apparatus for measuring the flow passing within a pipe,
and more particularly to an apparatus and method for measuring the speed of sound
propagating in the flow, having particles suspended within a continuous fluid, to determine
parameters, such as particle/fluid ratio, particle size and volumetric flow rate of the flow in
30 pipes using acoustic dynamic pressures.

