

ABSTRACT

DEVICE AND METHOD FOR GENERATING A BEAM OF ACOUSTIC ENERGY FROM A BOREHOLE, AND APPLICATIONS THEREOF

In some aspects of the invention, a device, positioned within a well bore, configured to generate and direct an acoustic beam into a rock formation around a borehole is disclosed. The device comprises a source configured to generate a first signal at a first frequency and a second signal at a second frequency; a transducer configured to receive the generated first and the second signals and produce acoustic waves at the first frequency and the second frequency; and a non-linear material, coupled to the transducer, configured to generate a collimated beam with a frequency equal to the difference between the first frequency and the second frequency by a non-linear mixing process, wherein the non-linear material includes one or more of a mixture of liquids, a solid, a granular material, embedded microspheres, or an emulsion.

Fig. 1