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**Large modulation of light beams by surface acoustic waves** BYUNG HANG HA, KANG SOO LEE, GHULAM DESTGEER, JIN HO JUNG, HYUNG JIN SUNG, KAIST, FLOW CONTROL LAB TEAM — We present a refraction-based method for light beam deflection with up to 20 degrees deflection angle and modulation bandwidth on the order of ten hertz. The mechanism utilizes sharp focusing of acoustic energy to produce a steep gradient of refractive index inside an optically-transparent media. The medium, fluid or solid, is subject to bulk acoustic waves (leaky Rayleigh waves) which is transmitted from piezo-actuated surface acoustic waves. The wavelets interfere to form a vertical gradient of acoustic energy density in the media as well as a refractive index gradient accordingly. Given the input acoustic energy, the biggest deflection angle is obtained when the light beam is given at the area where the refractive index gradient is largest. The device is based on lens effect and free from numerous limitations that acousto-optic deflector has: precise alignment of the incident angle of light beam is unnecessary, 100% deflection is achieved, the device is modulated by amplitude, not frequency and the deflection efficiency is not dependent on the polarity and the wavelength of light beam. The device can deflect, switch, and scan light beams and is applicable to pre-press, radar, laser imaging and displays, instrumentation and research.

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