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Peristaltic Flow of Non-Newtonian, Compressible Fluid with Non-zero Boundary Slip

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In Tsiklauri & Beresnev, *Phys Rev E* 64, 036303 (2001), we investigated new phenomena brought about into the classic peristaltic mechanism by the inclusion of non-Newtonian effects based on the model of a Maxwell fluid. In Tsiklauri, *J Acoust Soc Am* 112, 843 (2002), the effect of nonzero boundary slip velocity in fluid-saturated porous media was studied. Here we present a new advanced model of peristaltic flow which includes all relevant physical effects such as: non-zero boundary slip, non-Newtonian effects, and compressibility. Based on this model, the backflow (reflux) effect is also investigated which is a likely cause of vesico-ureteral reflux in urology. This study was motivated by the recent discovery of boundary slip Craig et al., *Phys Rev Lett* 87, 054504 (2001). The present work is the most general model of peristalsis created to date with wide-ranging applications in biological, geophysical and industrial fluid dynamics.