

Abstract Submitted  
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**Quantifying pumping effort and peristaltic work using balloon dilation catheters.**<sup>1</sup> SHASHANK ACHARYA, Department of Mechanical Engineering, Northwestern University, WENJUN KOU, Gastroenterology Division, Feinberg School of Medicine, Northwestern University, SOURAV HALDER, Theoretical and Applied Mechanics, Northwestern University, JOHN E. PANDOLFINO, PETER J. KAHRILAS, Gastroenterology Division, Feinberg School of Medicine, Northwestern University, NEELESH A. PATANKAR, Department of Mechanical Engineering, Northwestern University — Balloon catheters are widely used to study the mechanical response of blood vessels as well as the active and passive response of tubular organs like the esophagus. In this work, we focus on the EndoFLIP, a device used to characterize the esophagus' response to dilation. We present a simplified 1D model to predict the system's response to peristalsis and then use it to generate work curves that show how the muscle energy is being spent. We also observe the development of different pumping regimes based on the operating parameters and present work curves for each of these patterns. An extension of this 1D model is used to enhance data obtained from the device and generate work curves for patients with abnormal peristalsis. The detailed characterization of this system presented here will aid in better interpreting the data obtained from balloon dilation catheters used in patients for any tubular organs or tissue vessels.

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