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**Tim Cochran** and **Shelly Harvey\*** ([shelly@rice.edu](mailto:shelly@rice.edu)), Department of Mathematics, Rice University, P.O. Box 1892, MS 136, Houston, TX 77005-1892. *Higher-Order signature cocycles for subgroups of the Torelli Group*. Preliminary report.

Suppose  $\Sigma$  is a compact oriented surface and  $T = T(\Sigma)$  is its *Torelli group*. We describe new homology elements for certain *subgroups* of  $T$ , denoted  $J$  (e.g. one of the terms of the lower central series of  $T$  or one of the generalized Johnson subgroups). In particular we define higher-order signature defects and higher-order signature cocycles for  $J$ . The higher-order signature defects are real-valued quasi-homomorphisms and define elements of the second bounded cohomology of  $J$ . Some of the signature cocycles define non-trivial elements of the second integral homology of  $J$ . (Received February 05, 2008)