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**Tessa Murthy\*** ([tessa.murthy@yale.edu](mailto:tessa.murthy@yale.edu)), P.O. Box 200799, 206 Elm Street, New Haven, CT 06520. *Sequences of Ratios of 1-Periodic Functions.*

Sequences of Ratios of 1-Periodic Functions

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Consider the sequence of functions  $f_n = \sum_{k=1}^n \frac{|\sin(kx\pi)|}{k}$ . Steinerberger [2016] proves that this function has a strict local minimum at all rational points  $x = \frac{p}{q}$  where  $|q| \leq \sqrt{n}$ . There is a family of closely related functions

$$F_n(x) = \sum_{k=1}^n \frac{G(kx)}{H(k)},$$

where  $G$  is a 1-periodic continuous function and  $H$  is convex. Among these is the well-known Takagi blancmange function, which is known to have several interesting properties and has been used in extremal combinatorics.

Regarding the Steinerberger function, we provide bounds on local maxima (in particular, they cannot be too closely approximated by rational points with denominators less than  $\sqrt{n}$ ) and seek to determine an approximating function for the enveloping curve. We also consider various functions of the form  $F(x)$  and explore the self-similarity properties of  $F_\infty(x)$  when it converges. (Received September 05, 2018)