Year: 2020 | **Vol.: 97** | **Fasc.: 1-2**

Title: New congruences on multiple harmonic sums and Bernoulli numbers

Author(s): Liuquan Wang

Let $\mathcal{P}_n$ denote the set of positive integers which are prime to n. Let B_n be the n-th Bernoulli number. For any prime $p \geq 11$ and integer $r \geq 2$, we prove that

$$\sum_{\substack{l_1+l_2+\cdots+l_6=p^r \\ l_1,\ldots,l_6\in\mathcal{P}_p}} \frac{1}{l_1l_2l_3l_4l_5l_6} \equiv -\frac{5!}{18}p^{r-1}B_{p-3}^2 \pmod{p^r}.$$

This extends a family of curious congruences. We also obtain other interesting congruences involving multiple harmonic sums and Bernoulli numbers.

Address:
Liuquan Wang
School of Mathematics and Statistics
Wuhan University
Wuhan 430072, Hubei
P. R. China