ABSTRACT

The high concentration of microplastics in Indonesia's aquatic environments has led to the contamination of marine biota, with sources not only from plastic packaging but also from daily household laundry wastewater. If left untreated, microplastics will accumulate in aquatic organisms consumed by humans, resulting in an unintentional intake of approximately 15 mg per month. This study aims to develop Echo Pure, an innovative acoustic wave-based filtration device designed to reduce microplastic concentrations in laundry wastewater. Utilizing standing waves to concentrate microplastic particles at nodal points through acoustic wave interference, the prototype consists of a wastewater tank, an acoustic wave generator, and a filtration system employing piezoelectric buzzers. Filtration efficiency was evaluated by measuring initial and final microplastic concentrations using digital spectroscopy. The results indicate that this technology can effectively reduce microplastic levels, achieving a maximum filtration efficiency of 68% at a frequency of 6000 Hz. This research contributes to the theoretical understanding of acoustic wave applications in microplastic pollution mitigation while offering a practical solution for addressing wastewater contamination, particularly in regions with high levels of microplastic pollution.

Keywords: Filter, Microplastic, Laundry Wastewater, Acoustic Wave