INTISARI

Microbuble generator merupakan teknologi yang penting dalam berbagai aplikasi, seperti pengolahan air, karena kemapuannya untuk meningkatkan efisiensi transfer massa, terutama oksigenasi. *Bubble breakup* adalah proses penting yang mempengaruhi ukuran gelembung dan distribusinya dalam larutan. Pada penelitian ini, studi eksperimental berfokus pada analisis fenomena *bubble breakup* dan aliran balik (*return flow*) pada *microbubble generator* tipe venturi yang dilengkapi dengan twisted baffle di sisi inlet. Debit air (Q_L) dan udara (Q_G) divariasikan Q_L = 40 dan 60 lpm dan Q_G = 0,2 dan 0,6 lpm. Metode yang digunakan dalam penelitian ini meliputi visualisasi proses *bubble breakup* menggunakan kamera berkecepatan tinggi, pengukuran fluktuasi tekanan yang terjadi di MBG dideteksi oleh *pressure transducer.* Analisis *Power Spectral Density* (PSD), pengukuran kadar oksigen terlarut (*Dissolved Oxygen*) *Density Function* (PDF) *pressure drop*, dan *Discreate Wavelet Transform* (DWT). *Return flow* diamati dengan PIVlab, sebuah *tool* pada MATLAB R2023b.

Hasil penelitian menunjukkan bahwa variasi laju aliran air dan gas berpengaruh signifikan terhadap ukuran dan distribusi gelembung yang dihasilkan. Penambahan t*wisted baffle* terbukti meningkatkan efisiensi *bubble breakup.* Selain itu, fenomena aliran balik yang teramati di bagian divergen venturi berperan penting dalam mendistribusikan gelembung secara merata dalam aliran. Penggunaan *twisted baffle* dalam desain *microbubble generator* venturi dapat meningkatkan efisiensi *bubble breakup* dan meminimalkan aliran balik yang tidak diinginkan.

Kata kunci : *Bubble breakup, microbubble, return flow, twisted baffle*

ABSTRACT

Microbubble generators are essential technolologies in various applications, including water treatment, they can improve the efficiency of mass transfer, especially oxygenation. One important mechanism that affects the size and distribution of bubbles in a solution is bubble breakup. Analyzing the bubble breakup phenomenon and return flow in a ventury-type microbubble generator with twisted baffle at the inlet side is the main objective of this experimental study. The water flow rate (Q_L) and air flow rate (Q_G) were varied ad follows : Q_L = 40 and 60 lpm and Q_G = 0,2 and 0,6 lpm. A high speed camera was used to visualize the bubble breakup process, a pressure transducer was used to measure pressure fluctuations in the MBG, Power Spectral Density (PSD) was analyzed, dissolved oxygen levels were measured, the pressure drop Probability Density Function (PDF) was analyzed, and Discreate Wavelet Transform (DWT) was employed. The return flow has been observed with PIVlab, a tool in MATLAB.

The results show that changes in gas and water flow rates have a major impact on the size and distribution of the bubbles that are produced. It has been demonstrated thtat adding a twisted baffle improves the effectiveness of bubble breakup. The observed return flow phenomenon in the divergent region of the venturi is also essential for dispersing the bubbles uniformly throughout the flow. Twisted baffles can reduce undesired return flow and increase bubble breakup efficiency in venturi microbubble generator designs.

***Keywords** : Bubble breakup, microbubble, return flow, twisted baffle*