ANALISIS HUBUNGAN DEBIT ALIRAN TERHADAP NPSH *AVAILABLE* (NPSHa), NPSH *REQUIRED* (NPSHr) DAN *HEAD* TOTAL PADA POMPA SENTRIFUGAL UNTUK EVALUASI POTENSI KAVITASI

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ABSTRAK

Pompa sentrifugal merupakan peralatan yang banyak digunakan dalam sistem perpindahan fluida. Salah satu permasalahan yang sering terjadi adalah kavitasi akibat tekanan fluida pada sisi hisap turun di bawah tekanan uap jenuh. Kondisi ini dapat menurunkan kapasitas aliran, *head*, efisiensi pompa, serta menyebabkan kerusakan pada impeller dan casing. Terjadinya kavitasi dipengaruhi oleh hubungan antara *Net Positive Suction Head Available (NPSHa)*, *Net Positive Suction Head Required (NPSHr)*, dan *head* total yang berubah akibat variasi debit aliran. Penelitian ini bertujuan menganalisis hubungan debit aliran terhadap NPSHa, NPSHr, dan *head* total serta mengevaluasi potensi kavitasi pada pompa sentrifugal Calpeda B-CM 20E. Metode yang digunakan adalah kuantitatif dengan pendekatan deskriptif-analitis melalui pengujian langsung menggunakan variasi debit aliran pada putaran pompa konstan. Data yang dianalisis meliputi debit aliran, tekanan sisi hisap dan tekan, *head statis*, kehilangan *head*, serta spesifikasi pompa untuk menghitung nilai NPSHa, NPSHr, dan *head* total. Hasil penelitian menunjukkan bahwa peningkatan debit aliran menyebabkan NPSHa menurun, NPSHr meningkat, dan *head* total pompa menurun. Evaluasi potensi kavitasi menunjukkan bahwa pompa beroperasi dengan aman apabila nilai NPSHa lebih besar daripada NPSHr (NPSHa > NPSHr). Hubungan antara debit aliran, NPSHa, NPSHr, dan *head* total dapat digunakan sebagai acuan dalam menentukan kondisi operasi pompa yang aman serta meminimalkan risiko kavitasi.

Kata kunci: *Pompa sentrifugal, debit aliran, NPSH Available (NPSHa), NPSH Required (NPSHr), head total, kavitasi.*

ANALYSIS OF THE RELATIONSHIP BETWEEN FLOW RATE AND AVAILABLE NPSH (NPSHa), REQUIRED NPSH (NPSHr), AND TOTAL HEAD IN CENTRIFUGAL PUMPS FOR THE EVALUATION OF CAVITATION POTENTIAL

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ABSTRACT

Centrifugal pumps are widely used in fluid transfer systems. One common problem is cavitation, which occurs when the fluid pressure on the suction side drops below the saturated vapor pressure. This condition can reduce flow rate, *head*, and pump efficiency, as well as cause damage to the impeller and casing. The occurrence of cavitation is influenced by the relationship between *Net Positive Suction Head Available (NPSHa), Net Positive Suction Head Required (NPSHr),* and total *head*, which varies with changes in flow rate. This study aims to analyze the relationship between flow rate and NPSHa, NPSHr, and total *head*, as well as to evaluate the potential for cavitation in the Calpeda B-CM 20E centrifugal pump. A quantitative method with a descriptive-analytical approach was used, involving direct testing with varying flow rates at a constant pump speed. The data analyzed included flow rate, suction and discharge pressures, *static head*, *head* loss, and pump specifications to calculate the values of NPSHa, NPSHr, and total *head*. The results showed that an increase in flow rate caused NPSHa to decrease, NPSHr to increase, and the pump's total *head* to decrease. An evaluation of cavitation potential indicates that the pump operates safely when the NPSHa value is greater than the NPSHr value (NPSHa > NPSHr). The relationship between flow rate, NPSHa, NPSHr, and total *head* can serve as a reference for determining safe pump operating conditions and minimizing the risk of cavitation.

Keywords: *Centrifugal pump, Available NPSH (NPSHa), Required NPSH (NPSHr), total head, cavitation.*