

ANALISIS KARAKTERISTIK ALIRAN AIR PADA PERUBAHAN UKURAN PENAMPANG PIPA

Analysis of Water Flow Characteristics of Changes in The Size of a Pipe

Abdurrahim¹, Asih Priyati², Rahmat Sabani²

¹Mahasiswa Program Studi Teknik Pertanian, Fakultas Teknologi Pangan dan Agroindustri, Universitas Mataram

²Staf Pengajar Program Studi Teknik Pertanian, Fakultas Teknologi Pangan dan Agroindustri, Universitas Mataram

ABSTRAK

Tujuan dari penelitian ini adalah mempelajari karakteristik aliran pada rangkaian pipa akibat perubahan ukuran penampang dan mempelajari kehilangan energi pada aliran di dalam pipa yang memiliki ukuran penampang yang berbeda. Penelitian ini telah dilaksanakan pada bulan Agustus 2020 di Laboratorium Teknik dan Konservasi Lingkungan Pertanian Fakultas Teknologi Pangan dan Agroindustri Universitas Mataram. Parameter penelitian yang dikaji meliputi, debit dan kecepatan aliran, bilangan reynold, *head losses* mayor dan perubahan tekanan. Debit pada model pembesaran dengan manometer 0,000275 m³/s, debit model pengecilan dengan manometer 0,000320 m³/s. Semakin besar luas penampang akan semakin kecil nilai kecepatan aliran, bilangan Reynold dan tekanan aliran. Kecepatan aliran tertinggi terletak pada pipa ukuran ½ inch di rangkaian model pengecilan dan kecepatan aliran terendah terletak pada pipa ukuran 2 inch di rangkaian model pembesaran. Bilangan Reynold tertinggi terletak pada pipa ½ inch di rangkaian pengecilan yang memiliki luas penampang paling sempit. Tekanan pada rangkaian pembesaran semakin menurun dari pipa 1 inch tekanan sebesar 5725,16 N/m² dan pipa 2 inch tekanan sebesar 4978,4 N/m² sedangkan pada rangkaian pengecilan tekanan semakin meningkat dari pipa 1 inch tekanan sebesar 25.480 N/m² dan pipa ½ inch sebesar 36.946 N/m². Besarnya nilai *head losses* mayor pada rangkaian model pengecilan memiliki nilai yang lebih besar daripada model pembesaran. Pada model pengecilan nilai *head losses* mayor sebesar 0,04298 m dan pada model pembesaran sebesar 0,00245 m. Semakin besar luas penampang pipa akan membuat nilai *head losses* mayor semakin kecil.

Kata kunci: bilangan Reynold; debit dan kecepatan; *head losses* mayor; karakteristik aliran; perubahan tekanan

ABSTRACT

The purpose of this research is to study the flow characteristics of a series of pipes due to changes in the size of the section and to study the energy loss in the flow in pipes with different cross-sectional sizes. This research was conducted in August 2020 at the Laboratory of Agricultural Environmental Conservation and Engineering, Faculty of Food Technology and Agro-Industry, Mataram University. Research parameters studied include speed, flow rate, Reynold number, major head losses and pressure changes. Discharge in the enlargement model with a manometer of 0.000275 m³/s, the discharge of the reduction model with a manometer of 0.000320 m³/s. The larger the cross-sectional area, the smaller the value of flow velocity, Reynold number and flow pressure. The highest flow velocity is located in the ½ inch pipe in the reduction model series and the lowest flow velocity is located on the 2 inch pipe in the enlargement model series. The highest Reynold number is located on the ½ inch pipe in the

reduction series which has the narrowest cross-sectional area. The pressure in the enlargement series decreases from the 1 inch pipe the pressure is 5725.16 N/m² and the 2 inch pipe the pressure is 4978.4 N/m² while in the reduction series the pressure increases from the 1 inch pipe the pressure is 25,480 N/m² and the pipe ½ inch amounting to 36,946 N/m². The value of major head losses in the reduction model series has a greater value than the enlargement model. In the reduction model the value of major head losses is 0.04298 m and in the enlargement model is 0.00245 m. The greater the cross-sectional area of the pipe, the smaller the head losses value.

Keywords: *Reynold number; flow rate and speed; major head losses; flow characteristics; pressure change*