INTISARI

Bendungan memiliki tipe struktur *outlet* yang bervariasi, salah satunya *flip bucket*. *Flip bucket* banyak dijumpai di Benua Eropa, tetapi jarang dijumpai di Indonesia karena banyak bendungan yang memilih penggunaan pasangan antara *side spillway* dengan *hydraulic jump stilling basin.* Bendungan Meninting yang terletak di Lombok merupakan salah satu bendungan baru yang menggunakan *flip bucket* dengan tipe *circular-shaped bucket*. Menurut, Peterka (1984), *flip bucket* tidak memiliki persamaan matematis dalam perencanaan dan perkiraan performanya sehingga pengujian model hidraulika harus terus-menerus dilakukan di laboratorium hingga mendapat performa yang terbaik. *Flip bucket* memiliki bentuk berupa lengkungan (*circular-shaped bucket*) yang relatif lebih sulit dibuat secara presisi, baik model hidraulika, maupun konstruksi di lapangan. Oleh karena itu, penelitian ini dilakukan untuk menemukan model geometri alternatif dengan geometri yang lebih sederhana, tetapi performa yang dihasilkan hampir sama. Perkiraan performa yang terjadi akan disimulasikan secara numeris tiga dimensi menggunakan *software* ANSYS Fluent pada geometri yang terdiri atas garis-garis lurus (*triangular-shaped bucket*).

Simulasi dilakukan dengan membagi bentuk pelimpah menjadi dua, yakni mercu pelimpah hingga *outlet tunnel* sebagai simulasi pertama dan *flip bucket* sebagai simulasi kedua. Kedua simulasi tersebut dilakukan dengan debit kala ulang 100 tahun, 1000 tahun, dan PMF. Hasil dari simulasi pertama berupa kedalaman dan kecepatan aliran yang akan memasuki *flip bucket* pada simulasi kedua. Simulasi kedua menggunakan empat model geometri yang terdiri atas *circular-shaped bucket* eksisting, *triangular-shaped bucket* berbasis *baselength, triangular-shaped bucket* berbasis *angle, triangular-shaped bucket* berbasis *midpoint.*

Ketiga model geometri alternatif dapat digunakan untuk menggantikan *circular-shaped bucket.* Namun, setiap alternatif memiliki tingkat kemiripan dan konsekuensi yang berbeda-beda. *Triangular-shaped bucket* berbasis *angle* memiliki performa yang sedikit lebih baik, tetapi kurang *well dispersed* pada debit rendah. *Triangular-shaped bucket* berbasis *midpoint* memiliki performa yang hampir mencapai tingkat identik. Hal berbeda terjadi pada *triangular-shaped bucket* berbasis *baselength* yang memiliki performa lebih rendah dibanding model geometri lainnya.

Kata kunci: Simulasi Numeris, ANSYS Fluent, *Flip Bucket, Circular-Shaped Bucket, Triangular-Shaped Bucket.*

ABSTRACT

Dams have various types of outlet structures, one of which is the flip bucket. Flip buckets are often found in Europe, but are rarely found in Indonesia because many dams choose to use a pair of side spillway and hydraulic jump stilling basin. Meninting Dam, located in Lombok, is one of the new dams that uses a flip bucket with a circular-shaped bucket type. According to Peterka (1984), the flip bucket does not have mathematical equations in planning and estimating its performance so hydraulic model testing must be continuously carried out in the laboratory until the best performance is obtained. The flip bucket has a curved shape (circular-shaped bucket) which is relatively more difficult to make precisely, both in hydraulic models and construction and construction in the field. Therefore, this research was conducted to find an alternative geometry model with simpler geometry, but the resulting performance is almost the same. The performance will be simulated numerically in three dimensions using ANSYS Fluent software on a geometry consisting of straight lines (triangular-shaped buckets).

The simulation was carried out by dividing the spillway into two parts, spillway crest to the tunnel outlet as the first simulation and the flip bucket as the second simulation. Both simulations were carried out with discharge periods of 100 years, 1000 years, and PMF. The results of the first simulation are the depth and speed of the flow that will enter the flip bucket in the second simulation. The second simulation uses four geometric models consisting of an existing circular-shaped bucket, a triangular-shaped bucket based on base length, a triangular-shaped bucket based on angle, and a triangular-shaped bucket based on the midpoint.

Three alternative geometric models can be used to replace the circular-shaped bucket. However, each alternative has varying degrees of similarity and consequences. Angle-based triangular-shaped buckets performed slightly better, but less well dispersed at low flows. Midpoint-based triangular-shaped buckets perform almost identically. Different things happen to baselength-based triangular-shaped buckets with lower performance than other geometric models.

Keywords: Numerical Simulation, ANSYS Fluent, Flip Bucket, Circular-Shaped Bucket, Triangular-Shaped Bucket.