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The benefits of combining geometric attributes from labyrinth and piano key weirs

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2017

https://hdl.handle.net/10539/24034

Hoosen, Shenaaz (2017) The benefits of combining geometric attributes from labyrinth and piano key weirs, University of the Witwatersrand, <https://hdl.handle.net/10539/24034>

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ABSTRACT

South Africa is a water scarce country and dams play a large role in the infrastructure of our country by providing water for many purposes. With the growth of the country, new dams are needed and existing dams require rehabilitation. Often, increasing a spillways capacity forms part of the rehabilitation required at dams. Therefore, one of the main aims of this study is to look at an option for increasing a spillways discharge capacity. The labyrinth and Piano key weirs (PKW) were investigated together with a combination of the two spillway types. Different geometric attributes were combined and varied to develop a new design that would assist in improving discharge capacity while reducing the cost, producing an economically viable option. Thirty five physical models were built and tested in this regard. Comparison was made with the standard PKW design in terms of discharge capacity, hydraulic efficiency, length ratio (L/W) and cost related to concrete volume required. It was concluded that efficiency, discharge capacity and cost can be improved with this new combined design however more geometric variations need to be studied to ascertain these results.