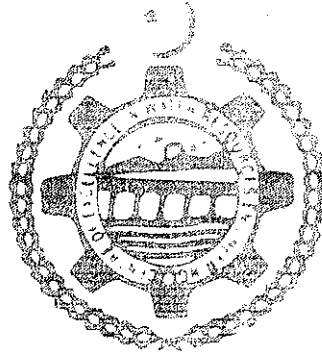


M.Sc Thesis

**NUMERICAL SIMULATION OF SEDIMENTATION IN THE SAND
TRAP CHAMBER USING NETNUS APPROACH**



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ADVISOR

PROF. DR. ABDUL SATTAR SHAKIR

Submitted By

**JAWAD AHMAD
(2010-PG-WRE-02)**

**CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING
University of Engineering and Technology,
Lahore-Pakistan**

2015

ABSTRACT

Sedimentation always remains a significant problem in reservoirs which not only reduces the useful life of the reservoir but also alleviate turbine erosion. In case of small hydropower project, efficiency of the sand trap in terms of sediment removal percentages is of significant importance. Sediment transport in the hydraulic structures is a very complex phenomenon which can be solved by using different Mathematical / Numerical Models; due to their obvious advantages such as time-saving, money-saving and scenario optimizing ability, these Models are being widely used for hydraulic structures to predict flow movement, sediment transport and channel bed variations. Sand Trap is the hydraulic structure built at the head of flow diversion structure in order to trap sediment to alleviate the abrasion of turbine units.

Research conducted to find out the sediment deposition (tons), longitudinal sedimentation thickness (m) and to compute the time of sedimentation reaching the threshold value (hours) for making of an operational manual for sediment flushing in the Sand Trap Chamber of Golen Gol Hydropower Project. For this purpose non-Equilibrium Transportation of Non-Uniform Sediment (NETNUS) Numerical Simulation Approach is used. All the computations of NETNUS Approach performed on MATLAB Software. Two different scenarios used in the research, one in which all three chambers in running state and the second in which only two chambers in running state with varying sediment concentrations i.e. 0.1 kg/m^3 , 0.2 kg/m^3 , 0.3 kg/m^3 , 0.4 kg/m^3 , 0.5 kg/m^3 , 0.6 kg/m^3 , 0.75 kg/m^3 and 1.0 kg/m^3 . Results of first scenario depicts that for 0.1 kg/m^3 , sand trap chamber will be half silted up in 4.3 days or 103 hours and in 1.6 days or 37 hours for the second scenario in order to carry out sediment flushing.