











- development at bridge abutments", J. of Hydraulic Research, IAHR, Vol. 41, No .5, PP.521-531.
- [4] Vice presidency for planning and budget, 1988, "Design principles of erosion control structures in rivers and canals", Report No. 417.
- [5] Przedwojski, B., 1995, River Training Techniques , Balkema, The Netherlands, Balkema, Rotterdam.
- [6] Vice presidency for planning and budget, 1988, "Design guidelines, construction and retention of river groins ", Report No. 516.
- [7] Ahmad, M, 1951, "Spacing and protection of spurs for bank protection", Research reported in hydraulics, Irrigation Research institute, Pakistan.
- [8] Kuhnle R.A., Alonso C.V. and Shields F.D., 1999, "Geometry of scour holes associated with 90° spur dikes", Journal of Hydraulic Engineering.
- [9] Elawady E. and Mansanori M., 2001, "Movable bed scour around submerged spur-dikes", J. of Hydraulic Engineering, JSCE, Vol.45.
- [10] Kuhnle R.A, Alonso C.V. and Shiels J.D., 2002, "Local scour associated with angled spur dikes", Journal of hydraulic engineering, ASCE. Vol. 128, No. 12.
- [11] Ishigaki T. and Baba Y., 2004, "Local scour induced by 3D flow around attracting and deflecting groins", Proc. 2<sup>nd</sup> Int. Conf. on Scour and Erosion, Meritus mandarin, Singapur, pp. 301-308.
- [12] Nagy H.M., 2005, "Hydraulic evaluation of emerged and submerged spur-dikes: temporal bed evolution and equilibrium state characteristics", Alexandria engineering journal, Vol. 44, No. 2, pp. 279-290.
- [13] Duan J, He L, Wang GQ, Fu XD. Turbulent burst around experimental spur dike.J Hydraul Eng 2009.
- [14] Vice presidency for planning and budget, 2011, "Design manual of calculating local scouring", Report No. 516.
- [15] Streeter K.W., 1997, "Fluid Mechanics", 9<sup>th</sup> edition, Ohio, Michigan.