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Numerical study of coupled transfer of heat and mass between air and water inside a geothermal water cooling tower MOHAMED MEHDI BASSEM, National Institute of Research on Rural Engineering, Water and Forestry, Tunisia (INRGREF), KARIM BOUROUNI, National Engineering School of Tunis (ENIT), MOHAMED THAMEUR CHAIBI, National Institute of Research on Rural Engineering, Water and Forestry, Tunisia (INRGREF), INRGREF TEAM — In the south of Tunisia, geothermal water is used to irrigate cultures. Since its temperature is very high (70 $^{\circ}$C), geothermal water is cooled by cooling towers. These towers are sized empirically and present many operating problems such as excessive energy consumption, big loss of vapour and low cooling efficiency. The aim of our work is modelling the coupled heat and mass transfer between air and water inside the cooling tower. The most important results obtained are that the evaporative potential is dominating the convective one in the cooling process. That's why the cooling is more efficient in summer than in hibernal period when humidity of ambient air reaches high values. In other hand, the negative convective phenomenon is illustrated. In fact, at the bottom of the tower, water temperature reaches the air one; the two fluids begin to cooling simultaneously. Air is cooled by convection and water by evaporation. We demonstrate also that there is no point in putting fans in working during cold weather. We studied also the effect of the variation of heat transfer coefficient on the efficiency of cooling.

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