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x

f_c f₀)

(K₄ و K₃، K₂، K₁)

(S_m)

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q(t)

g(t)

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$f_o \cdot (R=r/t)$

:R

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:fc

:f(t) .(

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:S(t)

$S_b :$

S_r

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:g(t) .($\Delta t_2 = \Delta t - \Delta t_1$)

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k_1, k_2, k_3, k_4

f(t)

((s(t))

,(Sm) :

(fc)

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: Δr

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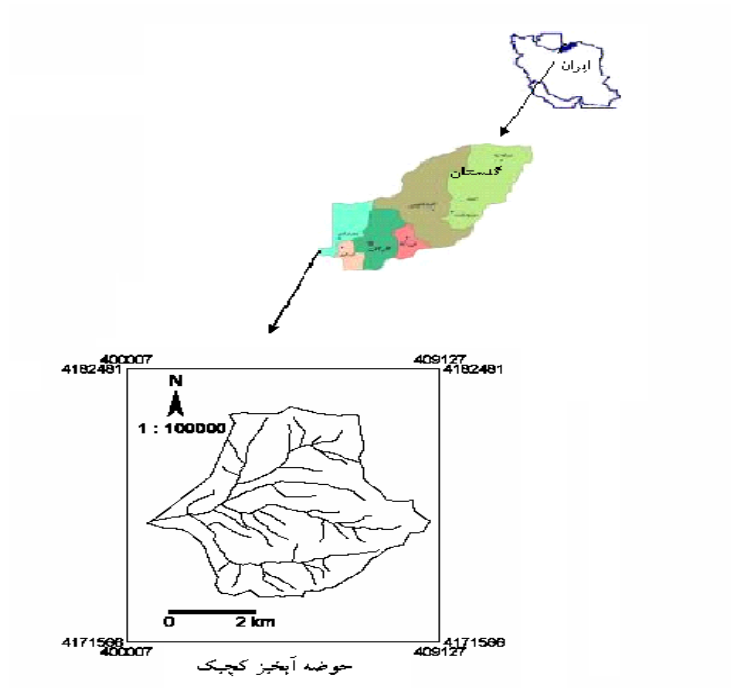
$R > f_b$

$R < f_e$ $R < f_b$

y(t)

q(t)

r(t)



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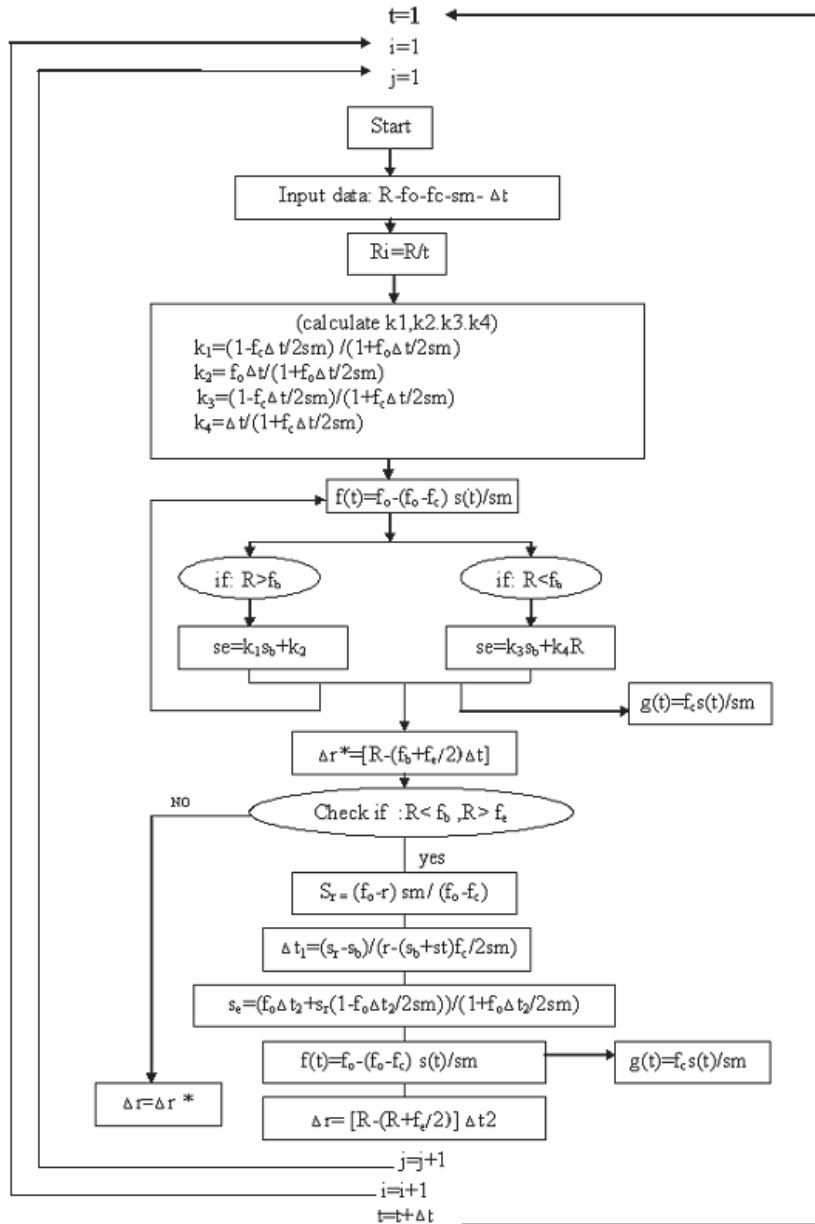
e : b

$R > f_c$ $R < f_b$

: i

j

$(f_i = f_o)$



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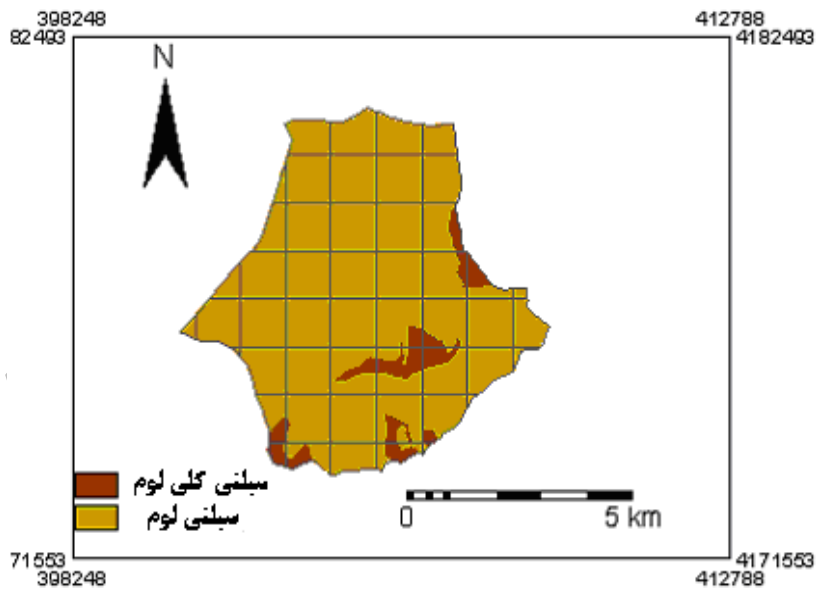
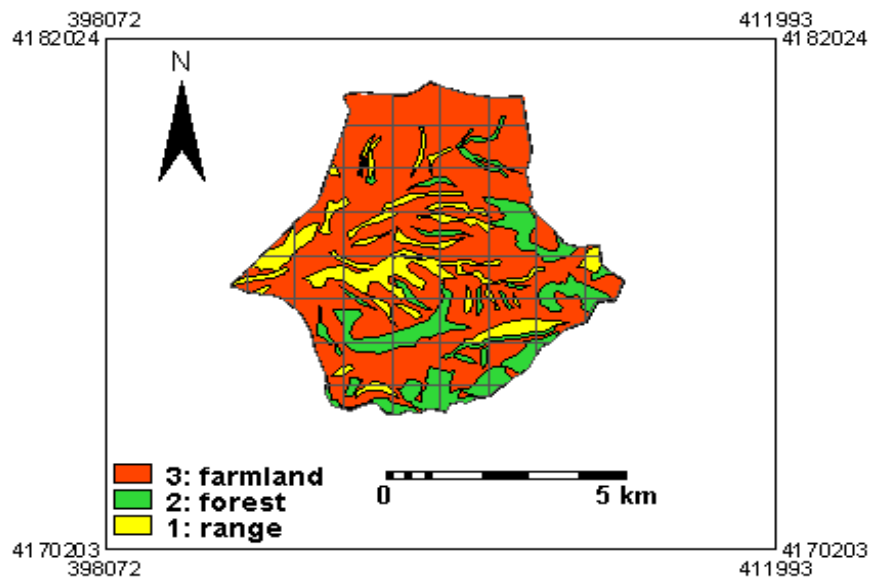
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k1,k2,k3,k4

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۲۳	۲۲	۲۱	۲۰	۱۹	۱۸	۱۷	۱۶	
۳۱	۳۰	۲۹	۲۸	۲۷	۲۶	۲۵	۲۴	
۳۹	۳۸	۳۷	۳۶	۳۵	۳۴	۳۳	۳۲	
	۴۶	۴۵	۴۴	۴۳	۴۲	۴۱	۴۰	
			۴۹	۴۸	۴۷			
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	K1	K2	K3	K4		K1	K2	K3	K4
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Application of GIS for calculation of runoff (Case study: Kechik Watershed, Golestan province)

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Abstract

In this paper the utilization of GIS for the parameterization of rainfall- runoff process, physically based hydrological model components is described. The heterogeneity of soil and vegetation in a catchment can be expressed with distribution functions of infiltration and soil storage capacities which derived efficiently by an overlay of a soil map with land use characteristics. These distribution functions are used to consider the non-linear distribution of actual saturation within a catchment with regard to their impacts on generation of excess rainfall and deep percolation during a storm event. The newly developed infiltration model components and its parametrization by GIS was successfully applied to Kechik catchment. To obtain the necessary information a simple digital soil map of the catchment was constructed by discretizing the watershed into 1×1 km² grid cells, and combined with the land use classification to estimate for each cell in a soil texture class the areal distribution function of infiltration model parameters consist of surface soil moisture content, maximum and minimum infiltration capacity rate (S_m , f_o , f_c), coefficients of model (K_1 , K_2 , K_3 & K_4) and excess rainfall. The results of the model application are shown that the rainfall-effective runoff relationships during storm events in catchment, by application of GIS technology, a new generation of hydrological model for micro and macro scale can be developed under consideration of catchment characteristics and their spatial heterogeneity.

Keywords: Geographical Information systems (GIS) – Rainfall - Runoff - Infiltration

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