Table 2. Skin friction coefficient τ for differents values of regulatory flow parameter

α	K_p	G_r	G_c	Γ	τ
0.2 0.4 0.6	0.2	3	2	0.2	3.88704208 4.01464129 4.19094113
0.4	0.1 0.2 0.5	3	2	0.2	5.65336650 4.01464129 2.41863134
0.4	0.2	3 5 8	2	0.2	4.01464129 3.72198836 3.27423418
0.4	0.2	3	2 4 6	0.2	4.01464129 3.47584359 2.93494351
0.4	0.2	3	2	0.2 0.4 0.6	4.01464129 4.02568064 4.03667082

Table 3. Nusselt number N_u for various values of regulatory flow parameters

t	γ	$\Pr_{eff}$	E_c	N_u
0.3 0.5 0.7	0.5	3	0.1	3.22837666 2.60946516 2.29138066
0.7	0.1 0.2 0.5	3	0.1	3.39849574 3.02131142 2.29138066
0.7	0.5	1 3 5	0.1	2.03641453 2.29138066 2.33208074
0.7	0.5	3	0.1 0.2 0.5	2.29138066 1.82913637 1.39620590

Table 4. Sherwood number S_h for differents values of regulatory flow parameters

S_r	K_r	t	S_h
0.3 **0.5** **1**	0.5	0.7	0.58390597 0.53380575 0.40918457
0.3	**0** **0.5** **1**	0.7	0.46650980 0.53380575 0.68794317
0.3	0.5	**0.3** **0.5** **0.7**	0.84118512 0.67079925 0.53380575

5. CONCLUSIONS

In the present investigation, the numerical simulation of transient MHD flow of a Casson fluid with the consideration of Joule heating, viscous dissipation and thermo-diffusion near a moving infinite non-conducting oscillating vertical flat plate embedded in a non-Darcy porous medium is performed by implicit finite difference technique of Crank-Nicolson type. Noteworthy outcomes of this investigation are summarized as follows:

- The three-dimensional plot for the velocity, temperature and concentration profiles explain completely to account for a certain level of time when the solution starts to converge.
- Since Casson fluid parameter and local inertia parameter induce a resistance to the fluid flow, the fluid velocity gets lowered with the increment in the values of these parameters. On the other hand, an advancement in thermal and solutal Grashof numbers and permeability parameter lead to enhance the velocity of the fluid throughout the boundary layer region.
- A significant downfall in fluid temperature is observed due to increase in effective Prandtl number whereas Newtonian heating parameter, Eckert number and time cause an elevation in the fluid temperature.
- Species concentration of the fluid is reduced as we increase the values of chemical reaction parameter while an adverse effect is perceived in case of Soret number, order of chemical reaction and time.
- Skin friction coefficient is getting improved on increasing either of Casson parameter and local inertia parameter whereas a reverse trend is followed by permeability parameter, solutal Grashof number and thermal Grashof number.
- Nusselt number N_u is enhanced with an increase in effective Prandtl number while a gradual decrement in this physical quantity is noted with increasing the values of Eckert number, Newtonian heating parameter and time.
- Sherwood number S_h is getting enhanced with an advancement in chemical reaction parameter whereas this physical quantity is getting diminished as we increase the values of Soret number, and time.

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NOMENCLATURE

g	acceleration due to gravity
q_r'	radiative heat flux
u'	velocity of the fluid along x' −axis
T'	fluid temperature
K_p'	permeability of porous medium
K_r'	chemical reaction coefficient
C'	species concentration
F	quadratic drag coefficient
c_p	specific heat at constant pressure
D_{CT}	soret diffusivity
k	thermal conductivity of the fluid
D	molecular mass diffusivity
E_c	Eckert number
K_r	chemical reaction parameter
K_p	permeability parameter
N	radiation parameter
G_c	solutal Grashof number
G_r	thermal Grashof number
R	magnetic parameter
S_c	Schimdt number
P_r	Prandtl number
Pr_{eff}	effective Prandtl number
S_r	Soret number

Greek symbols

σ	electrical conductivity
ν	kinematic coefficient of viscosity
ρ	density of the fluid
β_T	thermal expansion coefficient
β_C	coefficient of volumetric expansion
Γ	Forchheimer number
ω	frequency parameter