Comments on "Homotopy Perturbation Method for Thin Film Flow and Heat Transfer over an Unsteady Stretching Sheet with Internal Heating and Variable Heat Flux" by I-Chung Liu and Ahmed M. Megahed, Journal of Applied Mathematics Volume 2012, Article ID 418527, 12 pages

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The authors [1] studied the effect of thermal radiation and heat generation on the flow and heat transfer in a thin liquid film over an unsteady stretching sheet with variable heat flux .

Also the novelty in the above paper lies in considering the heat transfer aspects in a liquid film flow over an unsteady stretching sheet subject to variable surface heat flux conditions , **it is found there are fundamental errors :**

1- In the presence of thermal radiation effects , the effective thermal conductivity given by : $\kappa_{eff} = \kappa + \kappa_{rad.}$,where κ is the fluid thermal conductivity and $\kappa_{rad.}$ is the thermal conductivity due to the effect of thermal radiation . Then the surface heat flux is given by : $q_w = -\left[(\kappa + \frac{16\sigma^* T_o^3}{3k^*} \right] \frac{\partial T}{\partial y}$.

It is easy to see that the physical boundary condition for surface heat flux in the presence of thermal radiation given as : $-\kappa_{eff} \frac{\partial T}{\partial y} = q_w \qquad at\ y = 0$,

then the transformed boundary condition is : $\vartheta'(0) = \frac{-1}{(1+R)}$, where $R = \frac{16\sigma^* T_o^3}{3\kappa k^*}$ is thermal radiation parameter .

From the above it is found that the boundary condition $-\kappa \frac{\partial T}{\partial y} = q(x,t) \quad at\ y = 0$ in Eq.(2.6) and the transformed boundary condition $\vartheta'(0) = -1$ in Eq.(2.14) given in ref.[1] are wrong .**This error exists also in the published papers by Megahed [2-5] and Liu et al. [6] .**

2- In ref. [1] , the dimensionless film thickness has two values: (i) equal to β (above Eq.(2.11)) and (ii) equal to $\gamma = \beta^2$ also (below Eq.(2.16)). This is wrong because the film thickness is unique. The transformed equations are wrong [7] .

From the above comments it can be seen that the transformed equations and the surface heat flux boundary condition are wrong so all results obtained are incorrect .

References

[1] Liu,I.-C. and Megahed,A.M. , Journal of Applied Mathematics Volume 2012, Article ID 418527, 12 pages .

[2] Megahed,A.M., Rheologica Acta 51(2012) 841847- 841853 .

[3] Megahed, A.M., Can. J. Phy. 92 (2014) 86-91.

[4] Megahed, A.M., Journal of Mechanics . 30 (2014) 395 – 402.

[5] Megahed, A.M., Meccanica 02/2015; DOI: 10.1007/s11012-015-0114-3.

[6] Liu,I.-C., Megahed,A.M. and Wang, H.-H., ASME J. Appl. Mech.80(2013) (4), 041003.

[7] Mahmoud ,M.A.A., Open Science Journal of Mathematics and Application 3(2015) 14-18.