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Numerical simulation for melting heat transfer and radiation effects in stagnation point flow of carbon-water nanofluid

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1 ***Numerical simulation for melting heat transfer and***  
 2 ***radiation effects in stagnation point flow of carbon-***  
 3 ***water nanofluid***

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13 ***Abstract***

14 This attempt addresses the simultaneous characteristics of thermal radiation and melting heat  
 15 transfer effects in stagnation point flow of carbon nanotubes due to a stretching cylinder.  
 16 Velocity slip phenomenon is also retained. Two types of carbon nanotubes (single and multi-  
 17 walls) are homogeneously dispersed in the base fluid (water). The governing physical problem is  
 18 modelled and converted into set of coupled nonlinear ODE's utilizing transformations. Resulting  
 19 problems are computed numerically by fifth order Range-Kutta Fehlberg scheme. The physical  
 20 characteristics of various variables on the velocity and thermal fields are examined. Numerical  
 21 data for skin friction and Nusselt number have been prepared and deliberated. It is explored that  
 22 velocity is increased for larger ratio of rate constants. The increasing values of melting parameter  
 23 correspond to higher velocity and less temperature. Besides this the accuracy of present results is  
 24 also affirmed. It is noted that the computed numerical solutions have excellent match with  
 25 previous published materials in a limiting sense.

26 ***Key-words***

27 Stagnation point; Thermal radiation; Carbon nanotubes; Melting heat transfer; Range-Kutta  
 28 Fehlberg scheme.

29

<i>Nomenclature</i>			
$u, v$	velocity components	$\lambda_1$	latent heat of fluid
$U_e$	free stream velocity	$c_s$	heat capacity of the

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