THE INFLUENCE OF THE INFLOW GAS TEMPERATURE ON THE EFFICIENCY OF THE ACCRETION ENERGY PRODUCING

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It is not yet fully investigated the influence of the inflow gas parameters on the structure, stability, complete behaviour of the gas stream in close binary systems. Most of the authors are not pay attention on these parameters at all.

In our previous papers [1-2]we shown that the velocity and its direction acts very strong on the complete behaviour of the accretion flow.

During last years some author [4-6] shows, that these parameters are in fact the boundary conditions in the equation system, describing the gas dynamic. And, therefore, they are very important parameter, that can change hole picture.

In this paper we are investigate the influence of the temperature in the first Lagrangian point of the gas stream in close binary system on the produced x-ray luminosity at the inner part of the flow. We are made these investigation numerically, using 2D model, described in our previous works [1-3]. It was used the full energy-transfer equation [3].

We are used the following binary system parameters: $M_{ns} = 1,5\ M_o$, $M_2 = 4\ M_o$, $R_{21} = 10^{11}$ sm., debit of the inflow gas equal to $10^{-9}\ M_o$/year, the inflow angle equal to 30°. We made calculation for the inflow gas temperatures and respectfully fined the x-ray luminosity at the inner part of the flow after reaching the steady state, as follows in Table 1:

Table 1

inflow gas temperature [$^{\circ}$K]	x-ray luminosity [erg/s]
10^3	$3,426.10^{31}$
5.10^3	$2,0601.10^{32}$
$7,5.10^3$	$1,5484.10^{32}$
9.10^3	$1,3426.10^{32}$
10^4	$1,244.10^{32}$
2.10^4	$7,625.10^{31}$
5.104	$4,2842.10^{31}$
10^5	$3,426.10^{31}$
10^6	$1,55.10^{28}$
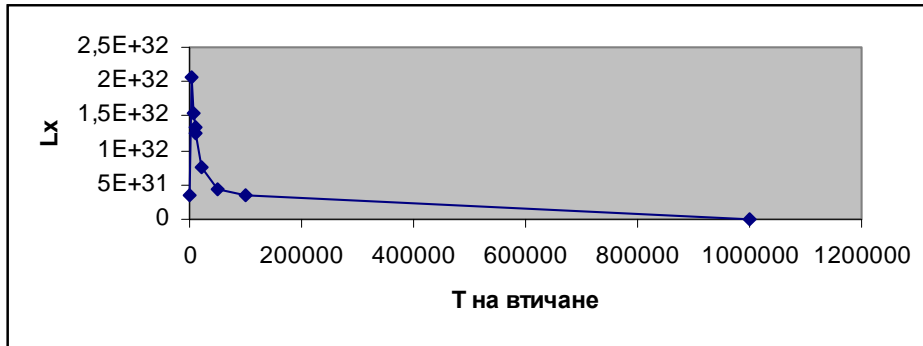
The same results are shown on the Fig 1.

Figure 1

As it is seen, the inflow gas temperature acts very strong on the efficiency of the energy producing in the accretion flow. More than this, if the inflow temperature is less then 10^3 °K, the steady state solution can not be reached in our model. If the temperature is very high, unfortunately, the efficiency decrease. In optimal case of temperatures between 10^3 K and 10^5 K, the efficiency varies 100 times.

As a conclusion we can say that all the parameter of the inflow gas stream plays very important role in the dynamically behaviour of the stream as a hole. And it is necessary these parameters to be included in all investigations.

References

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ВЛИЯНИЕ НА ТЕМПЕРАТУРАТА НА ВТИЧАЩАТА СЕ ГАЗОВА СТРУЯ ВЪРХУ ЕФЕКТИВНОСТТА НА ЕНЕРГООТДЕЛЯНЕТО ПРИ АКРЕЦИЯ

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РЕЗЮМЕ

На базата не двумерен числен модел на акреционното течение в тясна двойна звездна система е изследвано влиянието на температурата на втичащата се газова струя върху продуцираната Рентгенова светимост от повърхността на компактния обект. Показано е, че тази температура е от съществено значение за ефактивността на енергоотделянето при акреция. Като се имат предвид резултатите от предишни изследвания на зависимостта на динамиката на течението от останалите параметри на втичащата се газова струя, следва да се заключи, че всички тези параметри са от съществено значение и не бива да се пренебрегват.