

The MHD simulation of the shock waves generated by the interaction of the interstellar matter and the stellar wind

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The interaction of a stellar wind with the interstellar matter surrounding the star generates shock waves. In this paper, we examined the interaction of non-relativistic MHD stellar wind and interstellar matter by a numerical simulation. We specially studied the dependence of the character of the inner shock (reverse shock) wave on the magnetic field intensity and the rotation speed of the star. First, we examined the rotation speed. For the slower rotation, we obtain the reverse shock as the slow shock, but for the faster rotation, we see the fast shock. Second, we verify the shock for each rotation speed by making the magnetic field intensity into a parameter. In both slow and fast rotation cases, we obtained larger jump of physical amounts at the shock for smaller magnetic field intensity. If the rotation speed is large and the magnetic field intensity is small, we can see that the propagation direction of the reverse shock changes from outward to inward at a certain time. But for the large magnetic field intensity, the propagation direction is always outward. In this case, the propagation speed of the reverse shock is faster as the magnetic field intensity is larger. On the other hand for the small rotation speed, the propagation direction is almost outward. We can say that the amount of rotation speed is an important factor for investigating the character of shock waves which is generated by the interaction of a stellar wind and the interstellar matter.