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## Effects of cooling timescale and non-ideanness of the gas in the shockwaves

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### **Abstract**

Shock waves are observed in the aerospace engineering as well as in the interstellar medium. If the post-shock gas cools rapidly, its density can be very high so that the effects of the non-idealness in the equation of state are important. In this paper, we studied the effects of the cooling time-scale and the non-idealness of the gas in the cooling shock waves. With the Rankine-Hugoniot approximation, the ratio of the density of the post-shock region to the density of the pre-shock gas is evaluated according to the three parameters (1) Mach number, (2) the importance of non-idealness, and (3) the importance of the cooling time-scale. The results show that consideration of the cooling of the post-shock gas, with lower time-scales, could result in a denser post-shock region, while including the non-ideal effects dilutes it.

**Keywords:** shockwaves, non-ideal gas, gas cooling rate, fluid dynamics, interstellar, medium

For full article, refer to the Persian section