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Radio-Frequency capacitively coupled plasma(CCP) discharge technology is widely used in semiconductor etching, thin film deposition and other surface treatment processes, and the properties of the plasma play a key role in the control of these processes. And the fluid dynamics model, as one of the numerical simulation method, has the advantages of high calculation efficiency and fast calculation speed, therefore, it is widely used in plasma numerical simulation. But what kind of fluid model should be used under different conditions is not well understood and it needs further study. For example, in this paper, we aim to study the different results of plasma properties affected by using different fluid models. The proposed self-consistent fluid model consists of the electron continuity equation with the drift-diffusion approximation, the ion continuity equation, the electron energy density equation, the ion momentum equation, and the Poisson equation for electric potential. And another one uses drift diffusion approximation for ion equation, instead of ion momentum equation, and the rest equations are identical to the first model. And the different results caused by these two different algorithms are closely related to pressure, voltage, and frequency. In addition, it is concluded that the ion equation cannot use drift-diffusion approximation under some circumstances, such as low pressure and high frequency. The ultimate goal is to give a formal standard for the use of fluid models in the future.

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