A coating film forming method for forming a resist coating film on an upper surface of a wafer held by a spin chuck in a chamber includes (a) the step of keeping preliminary correlation data representing correlation between a wafer rotating speed and the thickness of the resist coating film formed on the wafer in the chamber, (b) the step of conveying the wafer into the chamber and holding the wafer by the spin chuck, (c) the step of pouring the resist liquid onto the wafer and spin-rotating the wafer to form a resist coating film on the upper surface of the wafer, (d) the step of detecting the thickness of the formed resist coating film by a sensor, (e) the step of detecting a rotating speed of the spin chuck by a sensor, and (f) the step of, on the basis of the detected film thickness and the preliminary correlation data, correcting a set rotating speed of the spin chuck to feedback-control a resist coating process for a next wafer.