Modelling of the Specimen Temperature Drop of a High Temperature Emissivity Measurement Facility

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Accurate emissivity measurement at high temperature, especially above 1000°C, plays a vital role in the high temperature processing, such as thermal modelling and radiation thermometry. However, it's extremely difficult to achieve a satisfying result, and very few results were published before [*M.Ballico, G.Neuer, G. Herdrich, M. Modest*]. The key issue of accurately measuring surface temperature is to maintain a hot surface without reflection of hot environment. We used the integral blackbody technique to solve such problem. A emissivity measurement apparatus at high temperature is building up based on this method at NIM. The apparatus consists of an air cylinder and a water-cooled copper cylindrical rod extension, it connects the air cylinder and a high strength graphite rod extending into a graphite tube furnace. Because of the reflections from the cylindrical section, the resulting cavity radiates as a blackbody. After the air cylinder rapidly moves the specimen to the end of the heater tube, the specimen exposes to the cooling environment. The ratio of the free standing radiation to the blackbody radiation is calculated, and it can be measured as the emissivity at high temperature [*C. Liller*]. In this study, the temperature drop of the specimen during the moving of the cylinder is simulated in order to achieve the accurate emissivity when the sample is exposed to the cooling environment. In this paper, a FEA model is used to model the thermal process and the results will be reported.