

IPB Reactor COP Calculation

March 9, 2017

Definition

Hpdrop : heater power drop after power deposit to the core in watts

V_1 : voltage RMS measured at the core entrance when *Q*-pulse

V_2 : voltage RMS measured at the core exit when *Q*-pulse

V_3 : voltage RMS measured across the RF termination resistor at the end of the transmission line. The termination resistors are mounted in a copper block that is water cooled . It has constant RF impedance in the freq range we are operating in. With this method we can estimate the pulse current by measuring V_3 and knowing the R_{term} resistance, $I = V_3/R_{term}$

P : applied stimulus power to the core either by *DC* or *Q*-pulse in watts

in *Q*-pulse

$$P = \frac{(V_1 - V_2) * V_3}{R_{term}} \quad (1)$$

$V^2 = (V_1 - V_2)^2$ when *Q*-pulse or voltage drop when *DC*
in *DC*

$$P = \frac{V^2}{R_{core}} \quad (2)$$

R is the resistance of core in *Q*-pulse at a given core temperature as the below:

$$R = \frac{V^2}{P} [volts^2/watts], [volts^2/watts] = [ohms] \quad (3)$$

M is the ratio of *Hpdrop* vs. applied stimulus power at a given core temperature as the below:

$$M = \frac{Hpdrop}{P} \quad (4)$$

From our experiments, R and M are constants of *Q*-pulse length 100ns and voltage 300v at a given core temperature.

Figure 1. shows M vs. temperatures in our two experiments From attached plots of R and M vs. temperatures, the error bars defined as the below:

$$ErrorBar = (\sum_i^n (y_i - (\beta_0 + \beta_1 * x_i))^2)^{\frac{1}{2}} \quad (5)$$

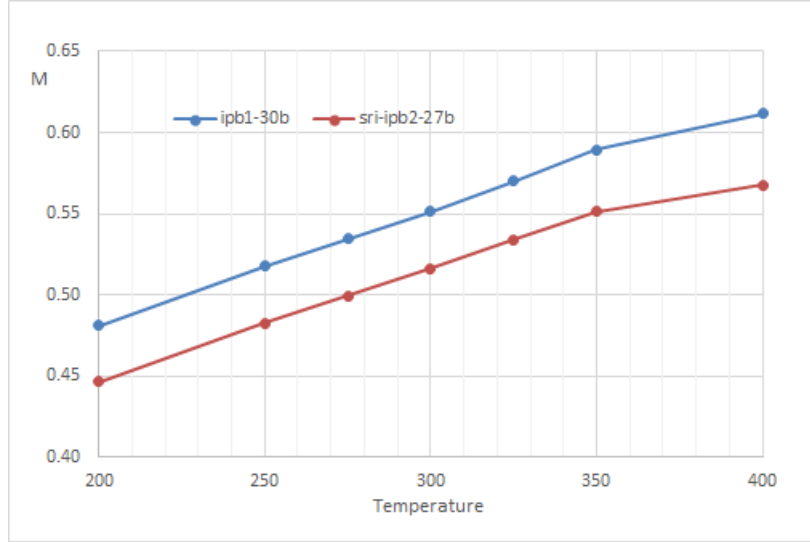


Figure 1: M vs. Temperature

i is a single point value of a given temperature, and n is total points of a given temperature.

COP Estimation

At a given core temperature

From the Figure 2

P_1 is applied stimulus power from DC or Q -pulse

$P_2 - P_1$ is stimulated power gain or LENR (Low Energy Nuclear Reaction) Power

COP is Coefficient Of Performance

$$P_2 = \frac{H_{pdrop}(Q)}{M_{cal}} \quad (6)$$

$$COP = 1 + \frac{P_2 - P_1}{P_1} = \frac{P_2}{P_1} = \frac{H_{pdrop}(Q)}{M_{cal} * P_1} \quad (7)$$

COP calculation of ipb1-30b and sri-ipb2-27b are in Figure 3 and Figure 4.

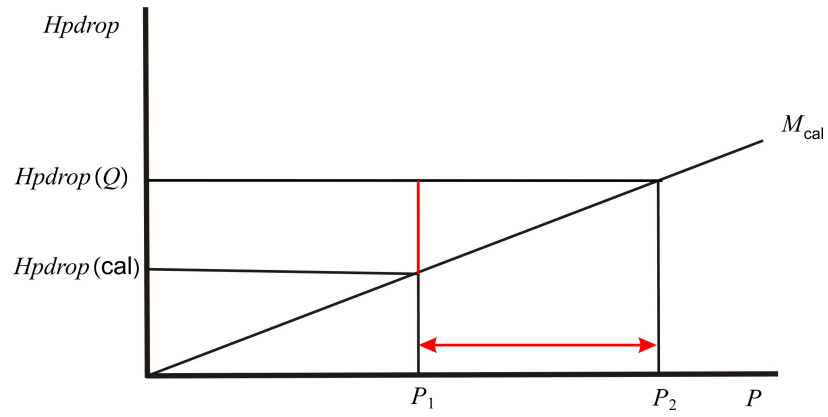


Figure 2: Hpdrop vs. P

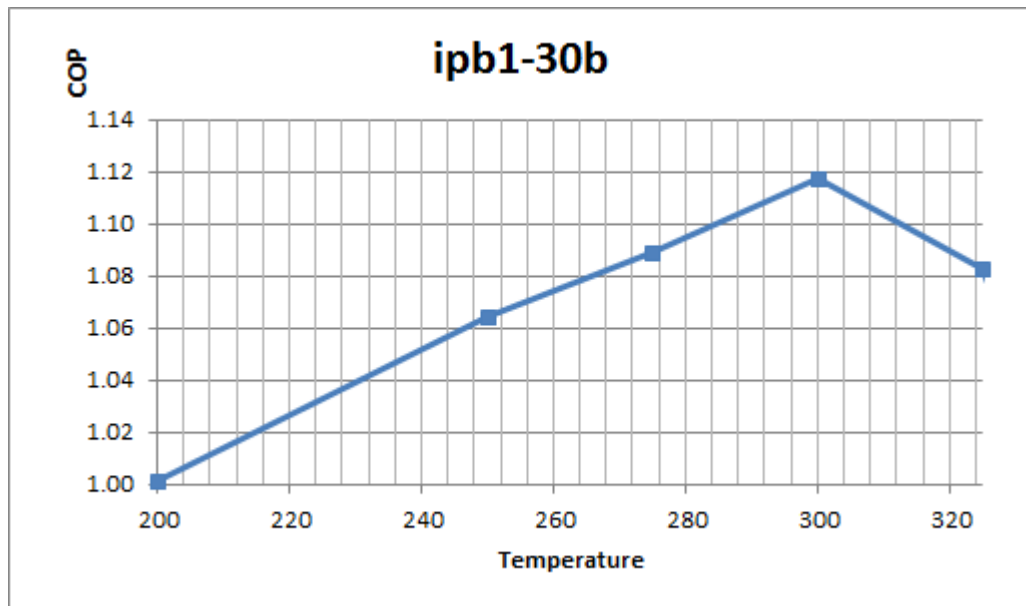


Figure 3: COP vs. temperature of ipb1-30b

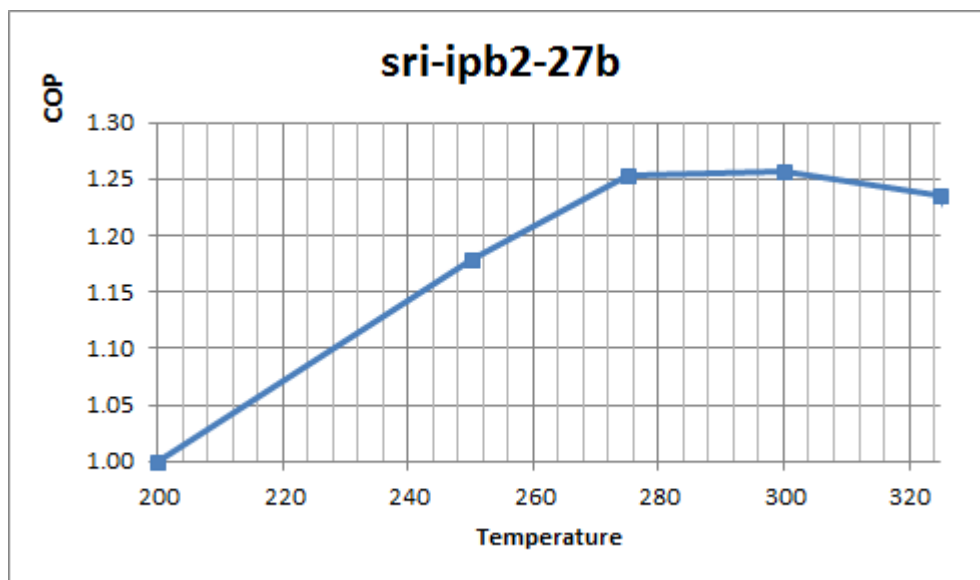


Figure 4: COP vs. temperature of sri-ipb2-27b