Discussion

Response to comments by L.C. Brinson and M. Panico

V.R. Buravalla *, A. Khandelwal

General Motors R&D, India Science Lab, 3rd Floor, Creator Building, International Technology Park, Bangalore, Karnataka 560 066, India

As discussed initially in Buravalla and Khandelwal (2007) and in the note by Brinson and Panico, an inconsistency existed in Brinson (1993) model resulting in violation of one of the compatibility conditions (refer Eq. (11) in Buravalla and Khandelwal (2007)). A correction to this was given by Buravalla and Khandelwal (2007). This work was carried out within the framework of the Brinson (1993). Hence, following the discussion after Eq. (27c) in Brinson (1993), \( \Omega_T \equiv 0 \). As a result, out of three compatibility conditions that are to be satisfied, two conditions given in Eq. (14) in Brinson and Panico are trivially satisfied. Since total \( \Omega \) (associated with total \( \zeta \)) was used in Buravalla and Khandelwal (2007) to incorporate the correction to the relevant material function, only one compatibility condition involving \( \Omega \) (Eq. (11) in Buravalla and Khandelwal (2007)) is needed. Hence the analysis in Buravalla and Khandelwal (2007) is consistent within the framework used.

In Buravalla and Khandelwal (2007), the expression for \( \Omega \) was obtained using the method outlined in Brinson (1993) (derivation of Eqs. (25)–(27)) and was not assumed \textit{a posteriori}. The method was not elaborated since it was the same as in Brinson (1993).

In their discussion, Brinson and Panico present a more general formulation using:

\[
\sigma = \sigma(e, \zeta_s, \zeta_T, T)
\]

\[
d\sigma = D(e, \zeta_s, \zeta_T, T) de + \Omega_s(e, \zeta_s, \zeta_T, T) d\zeta_s + \Omega_T(e, \zeta_s, \zeta_T, T) d\zeta_T + \Theta(e, \zeta_s, \zeta_T, T) dT
\]

In this analysis, the assumption \( \Omega_T \equiv 0 \) is relaxed. Hence the proposed model by Brinson and Panico is more general and complete. Since \( \zeta = \zeta_s + \zeta_T \), it may be mentioned that the final differential and integral forms derived in Buravalla and Khandelwal (2007) and Brinson and Panico are the same though the methodology is different owing to the differences mentioned here.

Authors are grateful to Prof. Brinson and Dr. Panico for the discussion and providing the complete formulation.