Zhuo-Heng He and Jianzhen Liu* (lj445@medaille.edu), 18 Agassiz Cir, Buffalo, NY 14214, and Tin-Yau Tam and Qing-Wen Wang. A system coupled Sylvester-type tensor equations over quaternion and its applications.

We consider the system of coupled Sylvester-type tensor equations $A_i \ast_N X_i - X_{i+1} \ast_M B_i = C_i$, $(i = 1, 2, 3, 4)$ over the quaternion algebra, where the operation $\ast_N$ is the Einstein product, $A_i, B_i,$ and $C_i$ are given quaternion tensors with suitable order. We derive some necessary and sufficient conditions for the solvability of this system in terms of Moore-Penrose inverses of quaternion tensors, and provide an expression of the general solution to this system when it is solvable. As an application, we provide some necessary and sufficient conditions for the solvability and the expression of the general solution to the system of mixed pairs of Sylvester quaternion tensor equations $A_1 \ast_N X - Y \ast_N B_1 = C_1, A_2 \ast_N Y - Z \ast_N B_2 = C_2$, where $Z$ is Hermitian. Some algorithms and numerical examples are presented to illustrate the results. (Received September 25, 2018)