Corrigendum

Corrigendum to “On the relation between conservation and dual consistency for summation-by-parts schemes”

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A few notational errors were recently discovered in the above publication.

- The notation used in the note is valid for fluxes of the form $f_L(u) = A_L u$, $f_R(v) = A_R v$ where $A_L = A_R$ is $m \times m$ constant symmetric matrix.
- The matrices Σ_L and Σ_R given in (10) should be transposed.
- We show that Proposition 1 in the note is valid even if A_L and A_R are variable, non-symmetric as well as equal and invertible at the interface.

The dual problem with interface conditions (neglecting boundary conditions) is

$$\begin{aligned} \theta_\tau - A^T \theta_x &= 0, & -1 \leq x \leq 1, & \tau > 0, \\ \phi(0, t) &= \psi(0, t), & x = 0, & \tau > 0, \end{aligned} \quad (1)$$

where $\theta, A = \phi, A_L(x, t) \in [-1 \leq x \leq 0]$ and $\theta, A = \psi, A_R(x, t) \in [0 \leq x \leq 1]$.

The semi-discrete primal problem with variable A_L, A_R is

$$\mathbf{w}_t + L\mathbf{w} = 0, \quad L = P^{-1}(Q + \Sigma)\mathbf{A}, \quad \mathbf{A} = \text{diag}(\mathbf{A}_L, \mathbf{A}_R), \quad (2)$$

where P, Q, Σ are given in the note and $\mathbf{A}_L, \mathbf{A}_R$ are block diagonal matrices approximating A_L, A_R at pointwise positions in x respectively.

The semi-discrete dual problem related to (2) is $\theta_\tau + P^{-1}L^T P \theta = 0$. Substituting L from (2) leads to

$$\theta_\tau - \mathbf{A}^T P^{-1}(Q - \tilde{\Sigma})\theta = 0, \quad (3)$$

where $\tilde{\Sigma}$ is given in the note. The vector $\mathbf{A}^T P^{-1} Q \theta$ approximates $A^T \theta_x$ and $\mathbf{A}^T P^{-1} \tilde{\Sigma} \theta$ impose the dual interface conditions if and only if the conservation condition (7) in the note is satisfied. Hence (3) is a dual consistent approximation of (1), and Proposition 1 holds also in this case.

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