Algorithm 3.3: Hybrid Schwarz Method corresponding to the error propagation operator

$$E = (I - \tilde{P}_1)\left[I - \tau(\tilde{P}_2 + \tilde{P}_3 + \ldots + \tilde{P}_J)\right](I - \tilde{P}_1)$$

(function version only)

$u^0 = \Phi \underline{u}^0 \in V$ given initial guess, and
τ given iteration parameter

FOR $n = 0$ STEP 1 UNTIL Convergence DO

$$w_1^{n,1} \in V_1 : a_1(w_1^{n,1}, v_1) = \langle F, v_1 \rangle - a(u^n, v_1) \quad \forall v_1 \in V_1$$

$$u^{n,1} = u^n + w_1^{n,1} = \tilde{P}_1 (u - u^n)$$

ASM subspace corrections

FOR ALL $j \in \{2, 3, \ldots, J\}$ DO IN PARALLEL

$$w_j^{n,1} \in V_j : a_j(w_j^{n,1}, v_j) = \langle F, v_j \rangle - a(u^{n,1}, v_j) \quad \forall v_j \in V_j$$

END FOR

$$u^{n,2} = u^{n,1} + \tau \sum_{j=2}^{J} w_j^{n,1} = u^{n,1} + \tau \sum_{j=2}^{J} \tilde{P}_j (u - u^{n,1})$$

$$w_1^{n,2} \in V_1 : a_1(w_1^{n,2}, v_1) = \langle F, v_1 \rangle - a(u^{n,2}, v_1) \quad \forall v_1 \in V_1$$

$$u^{n+1} = u^{n,1} + w_1^{n,2} = u^{n,2} + \tilde{P}_1 (u - u^{n,2})$$

END FOR