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Continue with the interim report, finish the outer loop algorithm:

4.2.6 Outer loop algorithm

Based on the result of Algorithm 2, for each SWIPT-Supported D2D link i, it has different transmission power $P_{i,j}^{D}$, power splitting ratio $\theta_{i,j}$ and energy efficiency $EE_{i,j}^{D}$ at different power segment j of EH. To achieve the target of maximizing EE of each SWIPT-Supported D2D link, further work needs to be done for selecting the best power segment at which each SWIPT-Supported D2D link i can achieve its maximum Energy Efficiency.

As shown in Algorithm 3, each SWIPT-Supported D2D link i is paired with a CUE k from its partner selection PS_i^{D}. And for each D2D link i paired with CUE k, similarly, the maximum number of power segment of EH model can be obtained using (16) , then it will traverse all of the power segment of EH and try to find the best power segment where the current D2D link i can achieve its maximum EE which can be denoted as $j^* = \arg\max\{EE_{i,1}^{D}, EE_{i,2}^{D}, \dots, EE_{i,j}^{D}, \dots EE_{i,N_{max}}^{D}\}$. Then the corresponding optimal value θ_i^* and P_i^{D*} can be obtained at the selected power segment of EH which are denoted as θ_{i,j^*} and P_{i,j^*}^{D} respectively.

After using Algorithm 3, each SWIPT-Supported D2D link i paired with CUE k will have an optimal value of transmission power P_i^{D*}, power splitting ratio θ_i^{D*} and Energy efficiency EE_i^{D*} at a specific power segment of the piecewise linear EH model.

The pseudocode of the outer loop algorithm based on my understanding is given:

Algorithm 3 Out loop Algorithm

Input	:	$EnaD, PS, \theta_{i,j}, P_{i,j}^{D}, EE_{i,j}^{D}$
Output	:	$P_i^{D*}, \theta_i^*, EE_i^{D*}$
Step 1	:	*for* $i \in EnaD$
Step 2	:	*for* $k \in PS_i^{D}$
Step 3	:	**Obtain** $P_{i,max}^{R}$ **using (5), and obtain** N_{max} **using function** A
Step 4	:	*for* $j = 1{:}N_{max}$
Step 5	:	$j^* = \arg\max\{EE_{i,1}^{D}, EE_{i,2}^{D}, \dots, EE_{i,j}^{D}, \dots EE_{i,N_{max}}^{D}\}$
Step 6	:	**Assign** $P_i^{D*} = P_{i,j^*}^{D}, EE_i^{D*} = EE_{i,j^*}^{D}, \theta_i^* = \theta_{i,j^*}$
Step 7	:	*end for*
Step 8	:	*end for*
Step 9	:	*end for*

After using using the three implemented algorithms, now the preference list needs to be implemented before using the final one-on-one stable matching algorithm, the pseudocode of it based on my understanding is given as following:

Algorithm 4 Preference list		
Input	:	$P_i^{D*}, EE_i^{D*}, \theta_i^*, EnaD, C, PS$
Output	:	Ω_i^D, Ω_k^C
Step 1	:	$for\ i \in EnaD\ do$
Step 2	:	$for\ k \in PS_i^D\ do$
Step 3	:	$get\ EE_i^{D*}$ **and place k into** Ω_i^D **in descending order of** EE_i^{D*}
Step 4	:	$endfor$
Step 5	:	$endfor$
Step 6	:	
Step 7	:	$for\ k \in PS_i^D\ do$
Step 8	:	$for\ i \in EnaD\ do$
Step 9	:	**obtain** $P_{interference}$ **caused by i using (16), and place i into** Ω_k^C **in ascending order of** $P_{interference}$
Step 10	:	$endfor$
Step 11	:	$endfor$