Algorithm 1 Directed Gradient Sign Method (DGSM)

Input: $\{\epsilon_k\}, A, B, U_0, X, \gamma, \rho$

Output: Δ

flag $\leftarrow 0$
$k \leftarrow 0$
while flag $= 0$ **do**
    $k \leftarrow k + 1$
    for $i = 1, \ldots, n$ **do**
        $\Delta \leftarrow \epsilon_k \text{sign}(\Pi_{\lambda_i}(\nabla_\Delta \lambda_i(U_0, X, \Delta)))$
        if $|\lambda_i(U_0, X, \Delta)| > 1$ **then**
            flag $\leftarrow 1$
            break
        end if
    end for
end while
return Δ