Let G be a directed graph with a set of vertices V and a set of edges E such that G = (V,E).
Let s be the source vertex and t be the target vertex of the flow in G.
Consider the max-flow f computed for G using the F-F Algorithm:

For the solution graph G_sol ,
Let A be the subset of V such that all vertices in A are reachable from s, the source.
Let A* be the subset of V such V-A=A*.

Suppose f(x) = the capacity of a cut from s to t such that f(x) = c(A,A*) where
c(S,T) = the sum of capacities for all vertex-pairs (u,v) where u is an element of S, and v is an element of T, and S is the set of all the vertices reachable by s and T is all the vertices reachable by t.

Then, f(x) = (the flow out from A )– (the flow in from A*) for a given subset of vertices, A.
Thus, for f(x) = c(A,A*) the following needs to hold.:
1. All outgoing edges must be at a full capacity
2. All incoming edges must have 0 flow

Consider two cases:
1. In G, there is an outgoing edge (d,e) where d is an element of A, and e is an element of A* such that f((d,e)) < c(d,e). Thus, there exists a forward edge from d to e in G_sol. Therefore there exists a path from s to e, which is a contradiction. Hence, any outgoing edge must be at full capacity.

2. In G, there exists an incoming edge (d,e), such that d is an element of A and e is an element of A*, where (d,e) has a non-zero flow. This implies that there exists an edge from d to e in G_sol. Thus, there exists a path from s to e, which is a contradiction. Therefore, any incoming edge must have zero flow.

These two cases show that the capacity of cut described above is the same as the flow of G.