1163-35-1206 **Alemdar Hasanoglu*** (alemdar.hasanoglu@gmail.com), Sehit Ekrem Dsitrict, Altunşehir Str., 41030, Kocaeli, Turkey. *Reconstruction of the principal coefficient in the damped wave equation from Dirichlet-to-Neumann operator.*

A novel approach is proposed for studying the inverse coefficient problem of identifying the principal coefficient $r(x) > 0$ in the damped wave equation $m(x)u_{tt} + \mu(x)u_t = (r(x)u_x)_x$, $(x,t) \in \Omega_T := (0,\ell) \times (0,T)$ subject to the boundary conditions $u(0,t) = s(t)$, $u(\ell,t) = 0$, from the Neumann boundary output $f(t) := r(0)u_x(0,t)$, $t \in (0,T]$. We propose detailed microlocal analysis of the regularity of the solution of the wave equation in each subdomain $D_n \subset \Omega_T$ defined by the characteristics of the wave equation. Based on this analysis we prove the compactness and Lipschitz continuity of the Dirichlet-to-Neumann operator corresponding to the inverse problem. The last property allows us to prove an existence of a quasi-solution of the inverse problem defined as a minimum of the Tikhonov functional and also Fréchet differentiability of this functional. A uniqueness theorem is derived. An explicit formula for the Fréchet gradient of the Tikhonov functional and its justification are derived by making use of the unique solution to corresponding adjoint problem. (Received September 15, 2020)