Calculating Satellite Position using Earth Sensor and Star Sensor

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The satellite position determination methods using ground station or GPS signal are usually used. Because these methods use external system the satellite position can not be achieved when the ground station can not contact with the satellite and GPS signal is not available. The time when satellite separates from launch vehicle or satellite rotates planet except for earth is applicable to the above case. In this paper, new approach is proposed which can determine satellite position without the external system. Star sensor which give information on satellite attitude in inertia coordinate and earth sensor which measure the center of the earth are used. Major idea of this paper is that the value which is measured by earth sensor includes satellite position information as well as satellite attitude information. Analysis for accuracy is performed in order to validate the proposed method.